

THE SCOTTISH GEOGRAPHICAL MAGAZINE



Volume 70, No. 3

December 1954

AN ANALYSIS OF SHOPS AND SERVICE TRADES IN SCOTTISH TOWNS		
J. B. FLEMING		97
FARMS OF VERDAL, NORWAY		
WILLIAM KIRK and FRANCIS M. SYNGE	Illustrated	106
THE GEOMORPHOLOGY OF THE EAST CHEVIOT AREA		
ROBERT COMMON	Illustrated	124
BEN NEVIS OBSERVATORY		136
GEOGRAPHY AT THE BRITISH ASSOCIATION		
OWEN HINCHLIFFE		139
REVIEWS OF BOOKS		141
PUBLICATIONS RECEIVED		154
EIGHTEENTH INTERNATIONAL GEOGRAPHICAL CONGRESS		157
SABENA INTERNATIONAL PRIZE		157
ROYAL SCOTTISH GEOGRAPHICAL SOCIETY:		
PROCEEDINGS		157
ANNUAL GENERAL MEETING		158
LECTURE SESSION 1954-1955		158
BRUCE MEMORIAL PRIZE: 1954 AWARD		158
NEWBIGIN PRIZE		158
REPORT OF COUNCIL—ABSTRACT OF ACCOUNTS		159

THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY
EDINBURGH



Since 1810 the name of The Commercial Bank of Scotland has been linked with projects—great and small—which have contributed to the development of Scotland. Through the years it has served the interests of Scottish men and women in all walks of life and in doing so has developed a tradition of friendly service.

Wherever modern banking services are required you will find the Bank prepared to help.

**THE
COMMERCIAL BANK
OF
SCOTLAND LIMITED**

HEAD OFFICE:

14 GEORGE STREET - - - EDINBURGH

General Manager:

IAN WILSON MACDONALD

**BRANCHES THROUGHOUT SCOTLAND
AND THREE OFFICES IN LONDON**

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

Patron

HER MAJESTY THE QUEEN

President

DOUGLAS A. ALLAN, C.B.E., D.S.C., PH.D., F.R.S.E., F.R.S.G.S.

Vice-Presidents

THE RIGHT HON. LORD ELPHINSTONE, K.T., LL.D., F.R.S.E.

*SIR HUGH McPHERSON, K.C.I.E., C.S.I.

THE RIGHT HON. THE EARL OF ROSEBURY, K.T., P.C., D.S.O., M.C., F.R.S.E.

*J. CAMERON SMAIL, O.B.E., LL.D., F.R.S.E., F.R.S.G.S.

ROBERT GRANT, J.P., F.R.S.E.

JAMES RITCHIE, C.B.E., D.S.C., F.R.S.E., F.R.S.G.S.

*ARCHIBALD E. ROBERTSON, B.D., F.R.S.E.

ROLAND E. COOPER, F.R.S.E., F.R.S.G.S.

*DOUGLAS GUTHRIE, M.D., F.R.C.S.E., F.R.S.E.

ARTHUR W. RUSSELL, O.B.E., W.S.

SIR ERNEST M. WEDDERBURN, O.B.E., D.L., D.S.C., LL.D., F.R.S.E., F.R.S.G.S.

THE RIGHT HON. THE EARL OF SELKIRK, O.B.E., A.F.C.

THE RIGHT HON. THE EARL OF WEMYSS AND MARCH, LL.D.

SIR EDWARD B. BAILEY, M.C., D.S.C., LL.D., F.R.S., F.R.S.E., F.G.S.

*ALEXANDER HARRISON, C.A., F.R.S.G.S.

*JOHN JOHNSTON, O.B.E., T.D., M.A., F.R.G.S.

W. CLARK SOUTER, M.D.

HIS GRACE THE DUKE OF HAMILTON AND BRANDON, K.T., P.C., O.C.V.O., A.F.C., LL.D., F.R.G.S.

THE RIGHT HON. LORD BELHAVEN AND STENTON, F.R.G.S., F.R.C.A.S.

*JOHN BARTHOLOMEW, M.C., J.P., M.A., F.R.S.E., F.R.G.S., F.R.S.G.S.

* Serving on Council

Chairmen of Centres

Glasgow: RONALD MILLER, M.A., PH.D.

Dundee: JOHN WATSON, M.A., B.S.C.

Aberdeen: ANDREW C. O'DELL, M.S.C., F.R.S.E.

Members of Council

As constituted 5th October 1954

Elected 1952

KATHERINE ADDISON SMITH

H. M. CADELL

ELIZABETH F. COMRIE

ALEXANDER DOUGLAS

HORACE FAIRHURST, M.A., PH.D. (Glasgow)

IAN R. GRANT

JAMES GLEN HARLEY, M.A.

ELEANOR A. HARPER GOW

ROBERT M. GALL INGLIS

ROBERT KERR, M.A.

SIR HUGH McPHERSON, K.C.I.E., C.S.I.

SIDNEY T. M. NEWMAN, M.A. (OXON.), F.R.S.E.

CHARLES J. ROBERTSON, M.A., PH.D.

GEORGE WATERSTON, M.B.O.U., F.Z.S.S., F.R.S.E.

Elected 1953

IAN G. CHARLSON

JAMES Y. ERSKINE, M.A., B.COM., F.R.S.G.S.

ISOBEL W. HUTCHISON, LL.D., F.R.S.G.S.

D. RONALD MACGREGOR, M.A.

J. NOEL PHILLIPPS, M.C., M.INST.T., F.R.G.S.

Trustees—ROBERT GRANT, J.P., F.R.S.E.; D.

ALAN STEVENSON, M.I.C.E., F.R.S.E., F.R.S.G.S.;

JOHN BARTHOLOMEW, M.C., J.P., M.A., F.R.S.E.,

F.R.G.S., F.R.S.G.S.

Hon. Treasurer—J. ALLAN BROWN

Joint Hon. Secretaries—DONALD G. MOIR, F.R.S.G.S.

J. C. BARTHOLOMEW, M.A., F.R.G.S.

Glasgow: JAMES B. GLEN, M.A., 9 Queensberry Avenue, Clarkston.

Dundee: D. M. BROWN, B.A., Morgan Academy

Aberdeen: SIR G. A. WILLIAMSON, D.L., B.L., 6 Union Row

HAROLD SKELTON

JOY TIVY, B.A., B.S.C.

ARTHUR R. WANNOP, O.B.E., B.S.C. (AGR.), B.ENG., F.R.S.E.

Elected 1954

WILLIAM BURNS, C.I.E., D.S.C., F.R.S.E.

LADY A. M. CLOW

G. C. DEWAR

GEORGE DOTT

ARTHUR GEDDES, D. B.L., PH.D.

J. B. HAMILTON, M.C., M.A. (Glasgow)

A. B. HYSLOP

WILLIAM LATIMER, C.A.

BARBARA P. MACFARLANE, M.A. (Glasgow)

H. A. MOISLEY, B.S.C., M.S.C. (Glasgow)

H. M. PATON, M.A.

J. E. RICHEY, M.C., B.A., SC.D., F.R.S., F.R.S.E., F.G.S.

F. D. N. SPAVEN, M.A.

BETTY M. THIRD, M.A., PH.D.

WILLIAM WATT, W.S.

Honorary Editor—RONALD MILLER, M.A., PH.D.

Hon. Librarian—CHARLES A. MALCOLM, O.B.E., M.A., PH.D., F.R.S.E.

Hon. Map Curator—J. C. BARTHOLOMEW, M.A., F.R.G.S.

Treasurer—SAMUEL CLARK CLAFFERTON

Glasgow: A. GRAHAM-SERVICE, C.A., 73 Dunlop Street

Auditor—GORDON G. RUFFLE, C.A.

Secretary—SQ.-LDR. B. K. D. ROBERTSON, A.F.C., R.A.F. (RETD.)

Editor—JOHN H. KENNETH, M.A., PH.D., F.R.S.E., F.R.S.G.S.

SOCIETY'S ROOMS: SYNOD HALL, CASTLE TERRACE, EDINBURGH

TELEPHONE: EDINBURGH, FOUNTAINBRIDGE 7776.

Bank of Scotland



*Constituted by Act
of Parliament 1695*

BRANCHES
THROUGHOUT SCOTLAND

SCOTLAND'S OLDEST BANK

THE SCOTTISH GEOGRAPHICAL MAGAZINE

Vol. 70, No. 3

December 1954

AN ANALYSIS OF SHOPS AND SERVICE TRADES IN SCOTTISH TOWNS

By J. B. FLEMING

THIS study is a continuation of the examination of towns and the areas they serve, which was contained in a previous article.¹ It is not, like the work of Bracey and Smailes, based on detailed surveys or questionnaires, nor can it take the place of such work, but is in the nature of a reconnaissance of a wide area to give a basis of comparison between one town and another. The analysis has been made possible by the publication of the results of the Census of Distribution² carried out in 1950 and was prepared in response to the need, found in town and country planning work, for some yardstick against which proposals for the reservation of land for commercial purposes could be measured. As pointed out by Ford and Thomas³ in their examination of the problem of shops in Southampton, it is not possible to prove, in any scientific sense, that any particular number of shops is the right one for any particular place; but local planning authorities cannot avoid making decisions about the land use aspects of the problem, and the greater the background of information available, the more reliable are such decisions likely to be.

The study of shopping facilities has long been difficult, particularly in Scotland, because of the lack of adequate information; while a number of individual surveys have been carried out in various towns, they are not always comparable and do not cover enough places to allow general conclusions to be drawn. Vol. I (Area Tables) of the Census of Distribution goes some way to fill this gap, in that it covers a large number of towns and, while the information it contains is limited, it is consistent for all the places covered. The statistics in the Area Tables refer to counties and burghs: for all burghs with a 1950 population of 2,500 or more these tables give the number of retail and service trade establishments, their total sales in 1950, the number of people they employ both full time and part time, and their total expenditure on wages and salaries. For burghs with a population of 25,000 or over the same information is given analysed by the kind

of business carried on in the establishment. Some information is also given about the central offices and warehouses of larger multiple organisations and co-operative societies.

An establishment is defined as a separate place of business engaged in one or more retail or service trade activities; department stores with free internal communication for customers are therefore regarded as single establishments. Sales cover the total trading receipts of the establishment for the year after deducting discounts or rebates to customers.

The interpretation of some previous surveys is difficult because they have relied on simple counts of shops and have not been able to

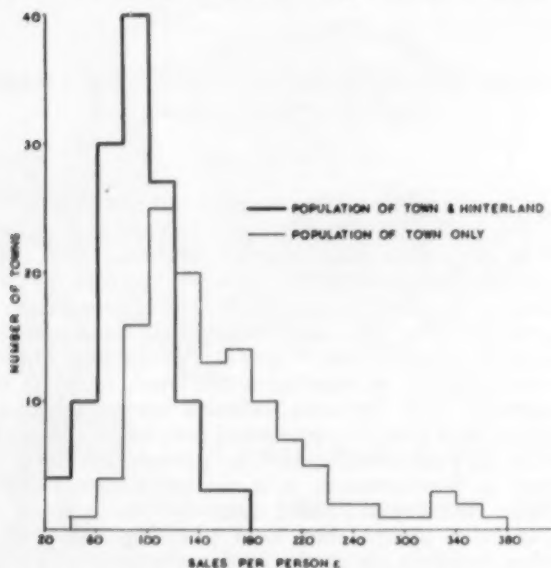


Fig. 1. Frequency distribution of towns according to total sales per person.

take account of the widely differing sizes of establishment. The Census of Distribution provides, in the figure of total sales, an index of the shopping business done in a town, which is independent of variations in the size of shops, and it is this quantity which has been used for the first analysis of shopping facilities in this paper. If the figures of total sales are compared with the total populations of the burghs, it is found that there is a very wide spread of the figure of annual sales per person, from £40 to £380, due to the fact that many towns serve a population considerably larger than that within their own boundaries. To correct for this it is necessary to add the population of the area served by each town, and for this purpose the populations of the 'hinterlands' as defined in the previous article¹ have been used; where a town has no hinterland, the town population alone has been

used. With this larger population the figures of annual sales per person have a smaller variation between £20 and £180, the average for all towns being £91.

Fig. 1, which gives histograms of the frequency distribution of sales per person plotted by both methods, shows the much closer grouping of the figures when the larger populations are used and suggests that there is a fairly close relationship between the total population of town plus hinterland and the total sales. This relationship has been further examined in the scatter diagram in Fig. 2, where the actual values of the two quantities have been plotted against each other. It will be seen from this diagram that the grouping of the plots is very close for almost all the towns whose total population of town plus hinterland is

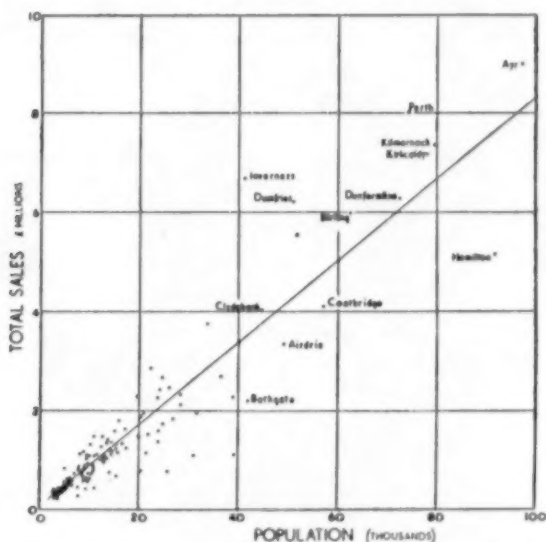


Fig. 2. Relationship between sales and population.

under 30,000, while for those above this figure the scatter is much wider. The reason for this lies in the population figures; the hinterland, as defined in the previous study, is only one kind of area served by the town, approximately that for weekly shopping needs, whereas in addition to this the larger towns and more important centres serve larger areas for specialised purposes. These larger areas served are not taken into account in the population figures but will influence the figures of sales.

Among the 98 towns below the 30,000 limit there are only two seriously anomalous cases, those of Cumnock and Hawick. Cumnock has a very low level of sales for the population estimated for its hinterland; the reason for this is not immediately clear and it may be that a re-examination of its hinterland, as previously defined, is necessary. Hawick has a particularly high level of sales, and this may be due to

the fact that, as the largest town in the Borders, it functions in a way similar to the towns in the larger group mentioned above and for some purposes serves a wider area than its hinterland. In calculating the statistical correlation between the total sales and the total popula-

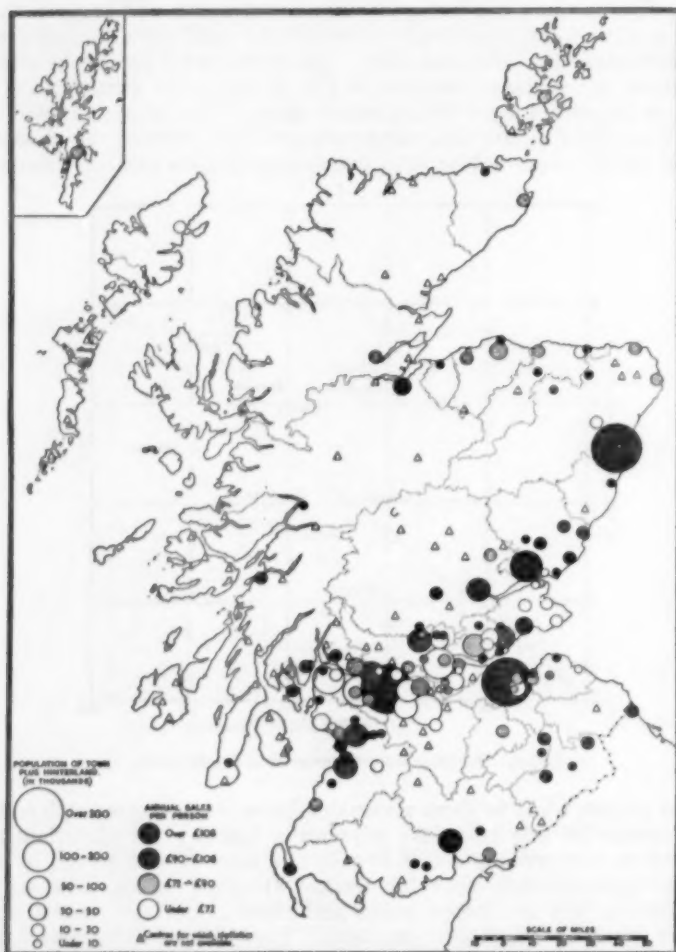


Fig. 3. Amount of business per head of population.

tions, the figures for Cumnock have been excluded, but those for Hawick have been included.

The co-efficient of correlation between the sales and population works out at 0.98, which shows a very close relationship, and from it the regression line for the variations in sales consequent on variations

in population has been calculated and is shown in Fig. 2. The expression for the relationship between the two quantities is :

$$y=0.824x+0.72$$

where x represents the population of the town plus its hinterland in

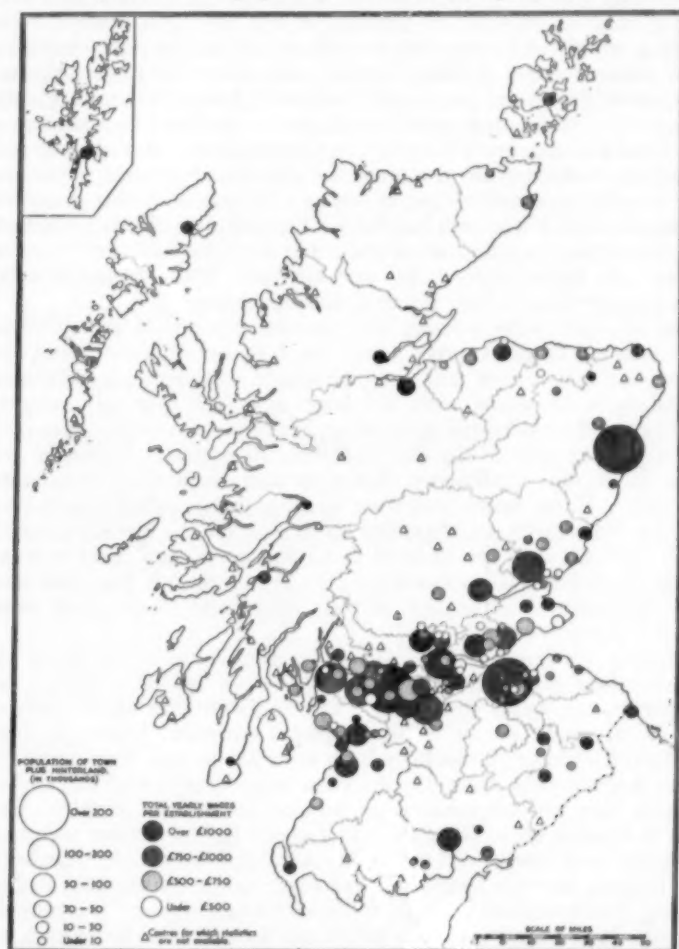


Fig. 4. Average size of establishment in relation to population.

thousands, and y represents the total sales per year in the town in hundreds of thousands of pounds.

While an expression of this nature must be applied with great caution, it could be used to indicate the approximate magnitude of the business arising from a group of population served by one centre for what might be described as its weekly needs.

Although the relationship between the total retail sales and the population served is very close in this group of smaller towns, the variations in the level of sales per person are of considerable interest and have been shown, together with those for the larger towns, on the map in Fig. 3, from which it will be seen that the towns with a high level of sales in relation to population fall into two groups. The first is a group of holiday resorts where the additional population in the summer raises the sales for the year above the normal figure; examples of this group are Oban, Rothesay, Largs, Helensburgh and Carnoustie. The second group consists of a number of rural centres, some of which may serve a rather larger population than that of their hinterland, while others provide some specialised services which are more usually provided by larger towns; examples of this group are Hawick, Turriff, Forfar and Maybole. The last of these was not defined as a centre in the previous article,¹ but lies close to the boundary between the hinterlands of Ayr and Girvan. These figures of retail trade suggest that, in fact, it has a small hinterland of its own.

Towns which have a lower level of sales per person are generally those near to larger centres which tend to overshadow them and, indeed, the map shows that over the whole area between Edinburgh and Glasgow all towns, even the large ones, fall into this category. Towns described as subsidiary centres in the previous article generally have low sales (e.g. Milngavie, Dalkeith, Anstruther, Inverurie) and so do Lochgelly, Linlithgow, Bathgate and, as already mentioned, Cumnock. These latter towns are to some extent subsidiary to Dunfermline, Edinburgh and Ayr, but the reason for the low sales may lie in the fact that they are situated in mining areas, and there is reason to believe that in such areas the local towns may not draw the trade of the agricultural population in their hinterland to the same extent as towns in other areas.

Among the larger towns, where the population of the town plus the hinterland is over 30,000, variations in the figures of annual sales per person are again significant. Fig. 3 shows that apart from the four cities, which are in rather a special category, Inverness, Perth and Dumfries have particularly high sales per person, suggesting that of the large burghs these are the most important as regional capitals and that they provide some of the services for which central Scotland looks to Edinburgh or Glasgow. The lowest figures of sales per person are found in the industrial towns like Airdrie, Motherwell, Coatbridge and Paisley, but the figures for the other large burghs like Falkirk, Stirling, Dunfermline and Ayr are not very much higher. It is probable that the areas round these towns are too accessible to Edinburgh and Glasgow for them to act as regional centres for areas much greater than their immediate hinterland.

The Census of Distribution can also provide some indication of the variations in the average size of shop in different towns. The figures for total sales can again be used or, alternatively, the figures of employment or of wages. The figures for employment are not very suitable, because they relate to one particular week in the year and may be affected by particular circumstances in certain towns. The total

sales are not entirely satisfactory, as they are influenced by the turnover as well as by the size of the shop, and wages probably provide the best index of the average size of establishment in each town. The figures in the Census are the total wages paid out over the whole year and so are not influenced by seasonal variations; they exclude the drawings of proprietors.

For each town the wages per establishment have been calculated and the results are given on the map in Fig. 4. The figures vary from £333 per establishment in Linlithgow to £1,548 per establishment in Inverness, the mean being £733 and the median £690. The average size of establishment measured in this way can be used to give a general indication of the kind of businesses which exist in any particular town, because the average wages per establishment vary markedly as between different kinds of business. This can be illustrated by reference to the figures for the whole of Scotland given in the following table:

KIND OF BUSINESS	WAGES PER ESTABLISHMENT
<i>Retail</i>	
Grocery Group	£737
Other Food Retailers	779
Confectioners, Tobacconists, Newsagents	216
Clothing Group	1,005
Hardware Group	640
Booksellers and Stationers	822
Chemists and Photographic Goods Group	923
Furniture Group	1,841
Jewellery, Leather and Sports Goods Group	679
General Group (Department Stores)	27,727
Coal, Builders' materials and Corn Group	1,043
Other non-food retailers	769
All Retail Establishments	829
<i>Service Trades</i>	
Catering Group	898
Hairdressers	383
Funeral Furnishers	780
Portrait Photographers	491
Repairers Group (shoes, watches, etc.)	236
Motor Vehicles, Cycles and Accessories Group	1,624
Motor Vehicles Repairs, Garage Group	2,385
All Service Trade Establishments	947
All Establishments	852

From this table, department stores would appear to have a dominating influence but, owing to the small number of them, this is not in fact the case. Out of a total of 62,000 establishments in Scotland there are only 154 department stores, of which 66 are in the four cities. It is, therefore, only in exceptional cases that this group will

affect the general conclusions drawn from the figures. Apart from the department stores, the kinds of business which tend to give a high average size of establishment are the Clothing and Furniture Groups, the Coal Merchants and Builders Group and the Motor Vehicles and Garage Groups, while food shops and the Hardware and Confectioners Groups tend to have a small size of establishment. Other factors will, of course, influence particular cases, but it is a reasonable assumption that the town with a high figure of wages per establishment will cater for a wider range of needs than that with a low figure.

To a limited extent this assumption can be checked by reference to the information given in the Area Tables for towns of 25,000 population and over, and Fig. 5 shows the percentage distributions of

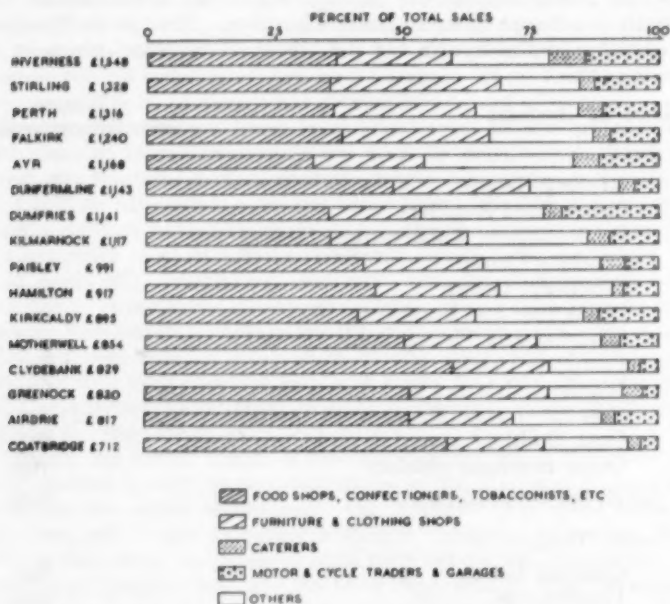


Fig. 5. Sales according to type of establishment.

the total business between different kinds of trade for the burghs of this size. Owing to the fact that this information relates only to towns which are large enough in themselves to support a fairly wide range of trade, the figures are not conclusive; but they do suggest that the assumption which has been made above is a reasonable one, and that as the average size of establishment decreases, the importance of the more specialised services decreases and the proportion of the more frequently required services increases.⁴

If Fig. 4 is examined, bearing these facts in mind, it can provide valuable information in addition to that obtained by comparing sales with population. While the normal tendency for the smaller towns to

have a smaller size of shop is clear, the map also shows a number of interesting variations of this. The most obvious example is Dundee, which has a smaller average size of shop than the other cities, and this is in accord with the conclusion, reached on other information, that Dundee, in fact, functions much less as a regional capital than Aberdeen, and in some ways less even than Perth. Among the large burghs, Inverness, Perth and Dumfries again come in the highest category, but are joined by Stirling, Falkirk, Ayr, Kilmarnock and Dunfermline. This suggests that these last six towns, while they do not serve such large areas as the other three, probably provide as wide a range of services for their own hinterland population.

Other towns where the average size of shop is large are Highland and Island towns like Dingwall, Lerwick and Fort William, or the centres of agricultural areas like Kelso and Elgin. In all these cases the population of the hinterland is large compared with that of the town itself, and it would seem to be a valid conclusion that, while the total volume of retail and service trade business is related to the total population served, the types of business and their relative importance will depend on the area from which that population is drawn. The following table illustrates this point: among towns serving a population of between 12,000 and 15,000 it will be seen that Kelso and Dingwall, where less than one-third of the total population is in the centre, have large shops, while Kilsyth, Fraserburgh and Bo'ness, which serve similar total populations but where nearly three-quarters of it is in the centre, have a much smaller average size of shop. There is a similar contrast between Elgin and Dumbarton.

TOWN	WAGES PER ESTABLISHMENT £	TOTAL POPULATION OF TOWN PLUS HINTERLAND	PERCENTAGE OF TOTAL POPULATION REPRESENTED BY POPULATION OF TOWN
Elgin	1,047	36,499	29
Alloa	782	31,342	43
Dumbarton	672	28,387	83
Dingwall	1,350	14,181	29
Kilsyth	774	14,351	69
Fraserburgh	771	13,501	77
Kelso	1,042	13,430	31
Bo'ness	489	13,909	72
Barrhead	496	12,971	100

This analysis could be carried further in a number of directions, but enough has been said to show that the Census of Distribution can provide a useful background for the study of towns and their function as service centres. One of the main limitations of the study is that it does not deal with the smaller burghs which are such an important

factor in the social geography of Scotland, nor with the larger settlements which are not burghs. For this reason it is to be hoped that overall studies of this nature will soon be supplemented by more detailed work parallel to that being carried out in England and Wales under the auspices of the Geographical Association.*

¹ FLEMING, J. B., and GREEN, F. H. W. Some Relations between Country and Town in Scotland. *S.G.M.*, 1952, 68(1): 2-12.

² *Census of Distribution and Other Services* 1950, Vol. I. Retail and Service Trades Area Tables. H.M.S.O. 1953.

³ FORD, P., and THOMAS, C. J. *Shops and Planning: The Second Report of the Southampton Survey*. Oxford: Basil Blackwell, 1953.

⁴ Vol. II of the *Census of Distribution* (Retail and Service Trades, General Tables), published since this article was written, contains other information on this point.

* [Such work is, in fact, in progress in the Department of Geography, University of Glasgow. Ed.]

FARMS OF VERDAL, NORWAY

By WILLIAM KIRK and FRANCIS M. SYNGE

The farm was to a marked degree what sociologists call an 'institution', a clearly defined centre of environment, built on a distinct material foundation and standing in definite relationship to the family and other social groupings—religious, economic, legal, political, convivial; a differentiated centre with an environment of its own into which the individual was born and which outlived him.

MAGNUS OLSEN¹

The 'commune' or district of Verdal, comprising the parishes of Vinne, Stiklestad, and Vuku, and closely coincident with the catchment basin of the Verdal river, extends from the north-eastern shores of the Trondheim Fjord to the Jämtland frontier of Sweden. In 1953 it had a population of 8717, of which about a quarter lived in the fjord-side township of Verdalsøra on the Nordland railway between Levanger and Steinkjer. Of its total area of 1542.78 sq. km. only 4.5% can be classed as agricultural land, 28% being under productive forest, 4.8% under freshwater lakes and the remainder given over to rock, bog, and non-productive forest, but upon this small proportion of farmland the majority of its population is dependent. The copper and nickel mines of the valley which once provided work are now closed; fishing has never been an important occupation; and full-time employment in forestry and woodworking is limited in comparison to that available in agriculture and agricultural services. Thus, here is essentially a community of peasant farmers in the prosperous agricultural region of the Trøndelag,² served by the dairy, State granary, farmers' co-operative, woollen mill, workshops and other urban facilities of Verdalsøra but expressing its adjustment to environment in a cultural landscape of dispersed farmsteads. The following study, arising out of the Aberdeen University Expedition to Norway in 1953,³ seeks to explore the evolution and present character of this community through its farm units.

THE CHALLENGE OF ENVIRONMENT

As in most parts of Norway, the richest agricultural land of Verdalalen is found on those marine deposits raised above sea-level by isostatic recovery of the Scandinavian land mass in late-glacial and post-glacial times.⁴ The upper marine limit of 210 m. thus constitutes a most significant divide of potential land use in the valley.

Above this old sea margin, attained during Portlandia times late in the ninth millennium B.C. when the Scandinavian ice sheet was rapidly waning and receding from the Ra moraine of the Trondheim Fjord, extend erosion surfaces largely developed in the Tertiary period

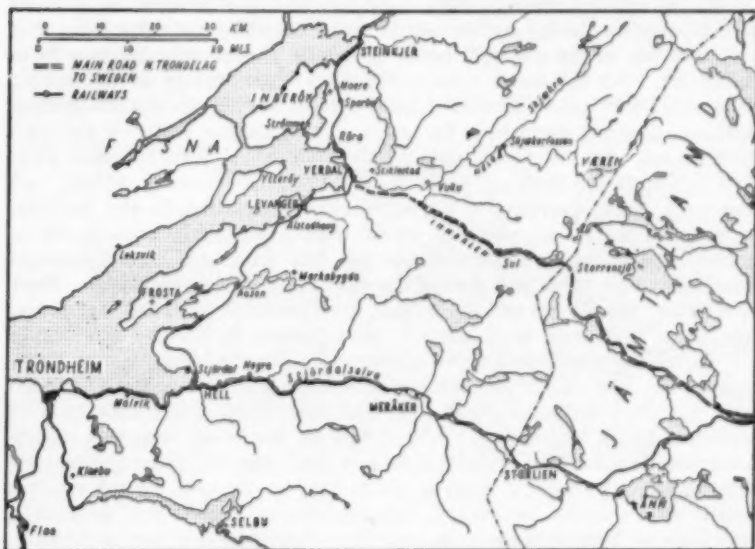


Fig. 1. Location of Verdal within the Trøndelag.

[The catchment basin of Verdal is covered by Topografisk Kart over Norge 1:100,000, 50A and 50B; and Sveraka Fjällkartan, Sheet 9 Torrön.]

on folded and fractured mica schists, quartzites, gabbro, and Silurian limestones of the truncated, ancient Caledonian Mountain System. These surfaces represent the westward extension of the 'Högfjälls' (Palaeic) surface of over 700 m., and the 'Förfjälls' (500-700 m.) peneplain of the lake-studded Jämtland Upland as described by Olaf Ångeby, above which rises the resistant, monadnock-like mass of Steuker (1229 m.) at the eastern extremity of Verdal.⁵ Following continental uplift in late Tertiary times, rivers entrenched themselves deeply, cutting precipitous gorges, either transversely to rock outcrop or along lines controlled by fracture belts, zones of less resistant phyllitic rocks, and the Caledonian trend of the country. In this process the westward-flowing streams have been most active, and the landforms and drainage pattern afford a great deal of evidence of the eastward

progression of watersheds. By the close of glacial times, which witnessed the formation of overdeepened rock basins along the lower reaches of the western rivers and stepped river profiles as a result of the forces of ice and polycyclic river erosion, the eastern watershed of Verdal had almost attained its present alignment, and beyond lay the great lake of Jämtland dammed by the receding edge of the Scandinavian ice centring on the Östersund district.⁶ For some 600 years until the Ragunda partition of the ice early in the seventh millennium B.C., this lake spilled westward through various overflow channels exposed successively as the ice withdrew from the watershed, and ranging from 500 to 430 m. in height.

River erosion subsequently modified the distribution of ground moraine left by the ice and lacustrine terraces left by shrinking lakes, but considerable areas are still covered by the hummocky deposits from dying ice. At the same time solifluction, particularly at the spring snowmelt, and peat formation have tended to fill up the ill-drained hollows, thereby providing the main distinguishing traits of the soils of the area. On the lower slopes, soils alternate sharply between well-developed, freely drained podzols on the spruce-covered knolls, and wet peat tracts carrying a *Scirpus-Molinia* association in the hollows. In some of the spruce podzols, where the A₁ horizon is missing, an A₂ horizon of striking whiteness occurs, but with less freely drained conditions this greys and finally disappears as gleying increases. Here and there, usually on gently-sloping, sandy parent material, are found humus podzols with a distinctive, dark brown B₁ horizon containing appreciable quantities of organic material. On the higher slopes above 450 m. the forest thins out, with pine replacing spruce as the dominant species, there are widespread bogs and drier open tracts covered with montane-heath vegetation. Above 550 m. the latter increases, associated with dwarf birch, juniper, rowan and stunted pine and spruce extending up to the tree limit at about 600 m. Beyond, stretch summit heath with Alpine bearberry, hermaphrodite crowberry, *Loiseleuria*, and lichens, bare rock surfaces, and the cirque-pitted slopes of Steuker.

Below 210 m. a very different landscape presents itself. Here—as isostatic recovery took place in post-glacial times, at first rapidly and then more slowly, and base-levels were progressively lowered, with interruptions at times by periods of still-stand or even slight submergence such as during the Tapes transgression in the fifth millennium B.C. when sea-level was still some 70 m. higher than at present—the rivers have cut a gigantic suite of terraces in the immense valley-fills of blue-grey marine clays and overlying deltaic sands and gravels. In such deposits headward erosion can be very rapid, particularly in May and June when river discharge is at its greatest following snowmelt in the upper catchment, and in October when a secondary maximum results from autumnal rains; and in earlier, wetter periods erosion must have been even more vigorous. At various points the rivers have cut down to rock floor, such as at the Vuku outcrop, and the waterfalls of Granfoss and Grunnfoss where dykes of quartz-porphry cross the valley, and such control points act as local base-levels for terrace formation. When, however, such barriers are circum-

vented, as has been the case at several localities, back-cutting may produce canyons over 100 ft deep in the clay within two or three years and leave the original waterfalls literally high and dry.

Modifications of the terrace pattern also result from clay slides, for which Verdal is notorious.⁷ Slides, which are caused by various factors of slope instability, normally develop retrogressively, widening as they do so, until either stable ground is reached or the cavity is so filled by pivoting and sliding masses as to block further escape. If quick-clays are formed, the slide may exhibit current and wave phenomena, carrying along sections of the surface crust complete with farms and trees, and usually disgorging through a relatively narrow debouchment or 'porten' located on the site of the initial slip. The great clay slide of 19th May 1893 in Verdal, which carried away almost 3 sq. km. of cultivated land and killed 111 people, was of this bottle-shaped type (see Fig. 2). In addition to the land damaged by the actual incavation, large areas downstream were



Fig. 2. Clay slides in lower Verdal, below Vuku, showing in particular the effects of the 1893 slide.

inundated by some 55 million cub. m. of liquid clay, and low-lying areas upstream submerged for several days by the damming of the river. Twenty-two large farms were completely destroyed and many others had sections of their land ruined by the deposition of clay, for the root-hairs of ordinary plants find it difficult to penetrate such deposits and many years of weathering, plant colonisation, and reclamation are necessary before these areas can be brought into cultivation again. The 1893 slide is, of course, only the latest major expression of this phenomenon and was preceded by many other similar occurrences which can be identified by the characteristic hummocky terrain of an old clay-slide, by farm-names such as Leirfald (*leir*=clay), and references in historical records. These earlier, prehistoric and historic, slides are indicated in the text-figure.

Soils and vegetation in the lower valley are closely related to this morphological evolution. On the present swampy flood-plains of the rivers and recently abandoned river-courses a rich variety of marsh plants—including water horsetail, buckbean, marsh cinquefoil, and

sedges—is found, but in those areas affected by the 1893 clay-slide, alder woodland is dominant. Indeed, wherever these slightly calcareous marine clays are exposed, the alder proves to be the most successful colonising agent and, as pollen analysis of local peat formations suggests, must have been more widespread in earlier periods. Since the closing phases of sub-boreal times, however, the most outstanding vegetational change has been the great increase of spruce forest at the expense of birch, alder and pine. The latter persists on the higher slopes and in some of the peat covered zones of the middle terraces, but has been steadily losing ground to spruce on the better drained terrace soils. As one would expect with average annual rainfalls of about 1200 mm. and monthly temperatures ranging from -5°C in January to about $+14^{\circ}\text{C}$ in July, the majority of soils are podzol variants, differing chiefly in their degree of drainage. Thus, on the lower terraces where fluvatile sands and gravel cap the marine clays, freely drained podzols are found, particularly on the leading edges of the terraces; while at the inner edges of the lower terraces, on the tenacious olive-grey silts of the higher terraces, and on the wide middle terraces where the water table is near the surface, imperfectly drained soils occur, ranging from forms exhibiting grey A horizons and yellow, mottled B horizons to wet peat. Where Silurian limestone outcrops, however, shallow red soils have developed, with a small granular structure, carrying some of the finest stands of Norwegian spruce in the valley.

Thus it will be seen that, in addition to the major contrasts provided by the land above and the land below the upper marine limit, considerable diversity is found within each terrain. Each tract has its problems as well as potentialities, and, as the farming frontier advanced into the primeval forest of the valley, such problems had to be faced before potentials could be realised. At each stage of pioneering activity the values placed upon certain aspects of environment by a farming community change in relation to the agricultural techniques available to it.

FARMING FRONTIERS

The first farmers in this region began to arrive about 2300 B.C. from the south and drew their inspiration from a Europe restless with economic change. In the drier, more continental climate of the sub-boreal period, when the sea-level still stood some 35 m. higher than at present and the terraces at Stiklestad and Vinne were being formed, they began to make the first inroads into the great forests which had developed during the preceding period when the warm, moist Atlantic air mass had been in the ascendancy. They were probably shifting cultivators using flint axes and fire to make small clearings, and elk-horn hoes and flint sickles to produce tiny crops of barley on the drier terrace soils of the lower valley. Fishing and hunting undoubtedly were still important in their economy, and thereby they must have come into contact with the slate-using coastal folk of the fjords and the relict hunting-groups of the high fjeld,⁸ thus providing a cultural bridge between east and west which was to strengthen in later times.

Flint had to be imported from the south in exchange for furs,⁹ and about 1500 B.C., bronze objects began to reach this remote district along coastal trade routes from the more highly developed Bronze Age civilisation of southern Scandinavia. Seafaring folk, with new religious ideas, burial customs, and a symbolic rather than naturalistic art, followed the routes of coastwise-sailing northward about the same time and appear to have imposed their authority on the native neolithic peasantry. The fertile coastal districts of Sparbu, for example, have yielded considerable evidence¹⁰ of a flourishing Bronze Age aristocracy with their cults of the sun and horse, and hunting trumpets or 'lurs'. About the same time the earliest of the imposing burial mounds which crown the terrace edges above 20 m. in lower Verdal appear to have been constructed. In the warmer climate of the period it is probable that cattle could be kept out of doors all the year round, increased greatly in number, and along with sheep and goats were involved in summer movements to pastures in the high fjeld. The opening of such transhumance routes, especially along the northern slopes of the Inna Valley, may well account for the appearance about 800 B.C. of certain elements of the East Swedish Bronze Age in the Trøndelag. The old road from Sweden, later known as 'Jämtlandsveien', down which St Olav and his army were to march to the battle of Stiklestad in 1030 and along which Jämtland traders brought furs by sledge to the marts such as Levanger on the Trondheim Fjord until the construction of the Östersund-Hell railway in 1881, probably originated in this way. Transhumance also played an important part in opening up route-ways and settlement in the Helgø valley at a much later period.

Not until the coming of iron, however, did the Verdal farmers possess an efficient means of clearing forest and dealing with the heavier soils of the lower valley. Imported luxury articles in bronze gave way to cheap iron tools, produced from limonite ores of the ill-drained uplands, in small clay furnaces. The light, wooden 'ard' plough of the Bronze Age with its yoke of two oxen was replaced by heavier ploughs armed with iron tips, culters, and later shares, necessitating larger teams.¹¹ Not until Saga times, however, was the sturdy Trønder horse harnessed to the plough. Iron axes, adzes and chisels facilitated more rapid felling and dressing of timber. The tempo of pioneering, however, was greatly retarded in the early phases of the Iron Age by a notable deterioration of climate, and, as Shetelig and Falk have pointed out,¹² whereas under sub-boreal conditions bronze-using groups penetrated as far as 68°N into the Arctic Stone Age cultures, in the first part of the following sub-atlantic period iron-using folk did not reach further northward than 60°. Pasturing of cattle out of doors throughout the year became no longer possible; and in the colder, damper conditions, customary cultivation failed to produce crops and famine was frequent. The paucity of finds dateable to this period in Verdal and neighbouring districts of the Trøndelag indeed suggest that after 400 B.C. considerable depopulation and retraction of the farming frontier occurred, and not until the early centuries of the Christian era do the numbers of iron objects and population begin

to increase again. Some new arrivals came from the South during the Roman Iron Age, bearing with them the farming traditions of Jutland and N Germany, but the largest ingress occurred in the Völkerwanderungen associated with the disintegration of the Roman Empire. About A.D. 400 considerable numbers of people began to trek over the watershed from Sweden and settle in the partly cleared but thinly populated tracts near the Trondheim Fjord. These were the Trønder, speaking a tongue quite distinct from those folk to the north and south of them, and organising themselves into eight communities of 'fylker' in the manner of the Swedish kingdom of Uppland. Verdal was one of the four northern communities of the 'inntrøndsk' which centred on the temple at Maere, and within a short time substantial timber farmsteads of the courtyard type similar to those of Jämtland and recalling those of Franconian terrains in Europe sprang up in the lower valley.¹³ These primary areas of settlement occupied before A.D. 600 are indicated in Fig. 3, by plotting farm names ending in *-vin*, *-em* (*heimr*), and other archaic elements, as analysed by the great pioneer of place-name study in Norway, Oluf Rygh, whose home actually lay in the valley.¹⁴ The concentrations at Trones and Vinne are supported by archaeological evidence in the form of grave mounds and a beautiful glass vessel of 4th century Rhineland ware recovered from the Vinne vicinity. Settlements avoid the then marshy and tidal area of the lowest reaches of the valley and string out along the edges of the drier terraces below Vuku. By this time a few farms had been created in the Helgø valley, but nowhere higher than Skjækerfossen, while the sole example in the Inna valley—Sul—just above the upper marine limit, probably originated as a staging point in the highway from Jämtland.

It was this Trønder community who then proceeded in the succeeding periods, shown in Figs. 3 and 4, to turn its back on the life of the fjords and push the farming frontier upwards and eastwards towards the high plateaux from whence it had sprung. Following the introduction of Christianity in the 11th century and the founding of the Bishopric of Trondheim (Nidaros) by the Englishman Nicholas Breakespear in 1152, ecclesiastical records and land surveys¹⁵ supplement the story obtained from place-name evidence and occasional references in the Sagas of this heroic endeavour which gained for the Trønder a reputation of stubbornness, earned the praises of Leopold von Buch¹⁶ in his *Travels through Norway* in 1807, and converted the region into one of the granaries of Norway.

Tract by tract, terraces of the lower valley, where not encumbered by extensive peat formations or devastated by clay slides, were brought into cultivation, either by members of the initial farming families splitting away from their home farms to create new farm 'cells' in another part of the forest, or by the conversion of original saeters into more permanent farmsteads as population pressure grew and the farming frontier advanced. During the Viking period progress was particularly rapid, and although Verdal farmers did not participate greatly in overseas expeditions, undoubtedly Verdal corn found its way across the Western Seas in 'hafskeips' sailing the 64th parallel to sustain the



1. Terraces on marine clays of Helgadal below Skjærfossen.



2. Lower Verdalen below Vuku.



3. Main dwelling-house at Otsjon Lappläger.



4. Old courtyard farmstead in Helgadal.



5. Farmsteads sited on edge of Stiklestad terrace.



6. Small holdings in lower Verdal.

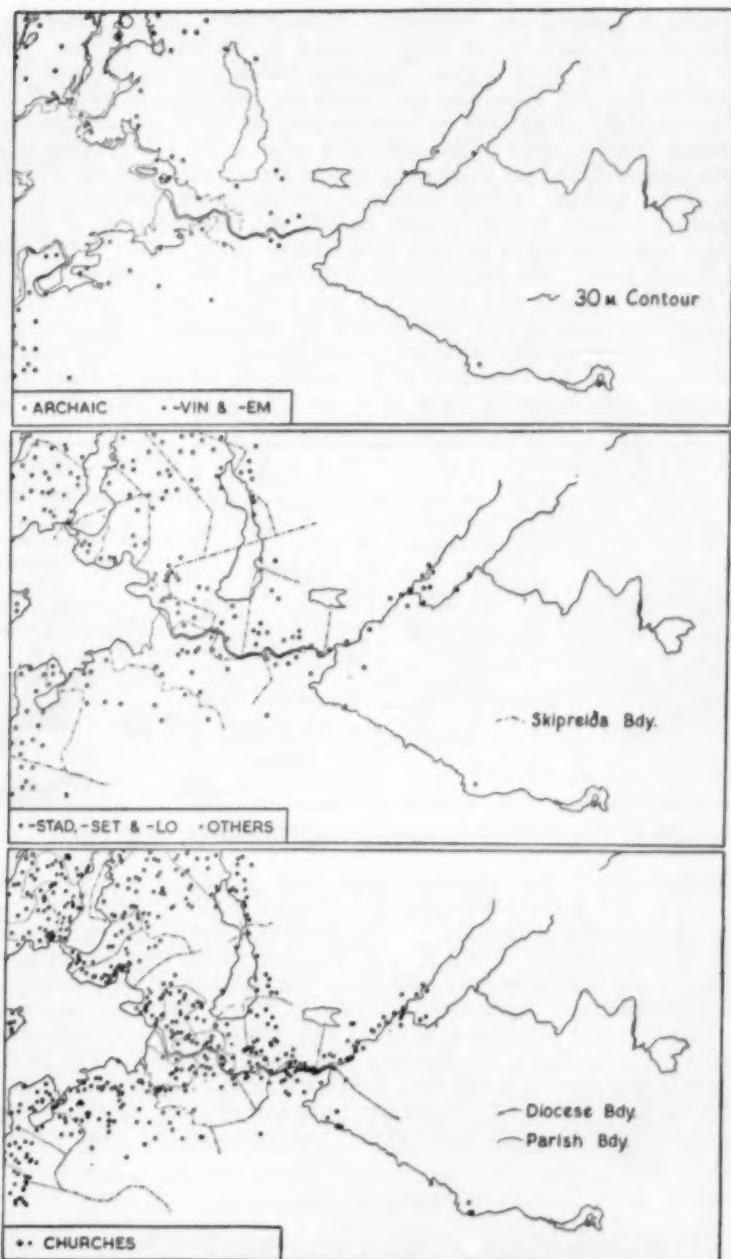


Fig. 3. Stages in the farming settlement of Verdal and adjacent districts, based on place-name and documentary evidence: before A.D. 600, before 1350, and before 1600, respectively.

colonies in Iceland, and 'skipreida' organisation¹⁷ existed within the fylke for some time before being replaced by Christian parishes. By the time of the Black Death (1349-50), which severely reduced the population of the Trøndelag and marks the beginning of the decline of power of the Trondheim Archbishops and the rise of new aristocratic farming families, most of the cultivable areas in the lower valley had been colonised, and the succeeding epochs merely witnessed the filling-up of the network of farm settlements to its present pattern. Outstanding features in that process include the fragmentation of older larger units detailed in the rich farm records of the valley;¹⁸ the sale of church lands; the introduction of turnips by the monks of Tautra in the 16th century and potatoes in the 1770's; the development of an excellent breed of milk cows during the 19th century; the rise and fall of Levanger as the marketing port of the area; the first permanent colonisation of the Være area in the middle of the 18th century and eventual completion in 1902 of a road from that area direct to



Fig. 4. Present distribution of farms. Many of the saeters shown are disused.

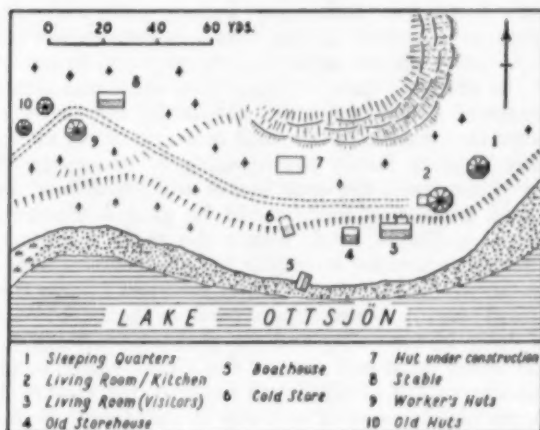
Skjækerfossen; the continued links with Jämtland via the Inna valley; and the development of a forestry policy balanced against the various other demands placed on the area of the Verdal catchment. The farming frontier is still present, however, in the vigorous attempts being made to reclaim peat lands under the guidance of the Norwegian Bog Association's Experimental Station at Maere,¹⁹ and the successful efforts to bring old clay-slide areas and poorer soils into cultivation once more by liberal applications of artificial fertilisers. The forest, though now tamed, is still with the people, and their farmsteads bear the marks of the forest frontier from which they grew, as will be seen in the following sample studies of farms in the upper and lower terrains of the valley.

UPLAND FARMS

In the high, forested country of the eastern watershed, in Swedish territory, are located a number of Lapp settlements (*Lappläger*).²⁰

These range from temporary encampments, such as on the shores of Mansjön, (*sjö*=lake), to the more permanent settlements of Grönås in Straadalen, and Ottsjön. The latter settlement, shown in Fig. 5, stands at an altitude of 470 m. on a south-facing slope sheltered from the north by bold rock outcrops, and overlooks a bay at the north-west section of the lake. The farm economy centres basically on a herd of some 2000 reindeer which graze in the open spruce, pine, and birch forest, and as reindeer are valued currently at about 150 kr. (Swedish) a pair, it will be seen that the farm is by no means poverty-stricken. For the summer months the reindeer move to the higher mountain pastures and are occasionally visited there by the Lapp herders, but otherwise the old nomadic life has vanished in this area. The deer breed annually and are rounded up in the autumn, when the young animals are branded and some of the mature beasts killed for meat.

Fig. 5. Plan of Lapp settlement at Ottsjön.



The live weight of a fully grown reindeer may be 50-70 kg. and its meat sells at about 4 kr. per kg. in the Jämtland markets. Some meat is dried and smoked, skins are cured and tanned with willow bark, while antlers and furs are used to make various articles for sale to visitors attracted to the region by its elk hunting, fishing and winter sport facilities. Fish taken from the lake by line and net, goat milk, and potatoes and rhubarb grown on a small plot near the farmstead eke out the diet, but for other foodstuffs the community is dependent on supplies brought from Åbo in the south and Skjækerfossen in Verdal. Modern household equipment has been imported along the same routes and contrasts strikingly with the extremely ancient crafts in wood and lake-reeds which still survive. The old self-sufficient economy and culture of many Lapp communities such as this is fast disappearing, although, as the folk rarely marry outside their own groups, the purity of their racial stock has been maintained even if their numbers are decreasing.

The farm buildings at Ottsjön show many contrasts in form and materials characteristic of this cultural transition the Lapp communities are undergoing. Of particular interest, however, is the manner in which the Lapp dwelling houses preserve the antique forms reminiscent of a teated encampment while the other buildings of the farm conform to the normal rectangular plan of the neighbourhood. The imposing hut used as the family living room, for example, is octagonal, with a floor diameter of 24 feet. Its walls are only two feet high and from them an eight-sided timber and turf roof slopes upward to a height of almost 20 feet, with window frames built out on the northern and southern facets and an entrance vestibule on the western facet. In the centre of the timbered floor a masonry platform bears a wood-burning stove from which a metal chimney carries smoke up to an opening in the apex of the roof, covered by reindeer hides during severe snowstorms. Sleeping quarters are separate and consist of an older hut a few yards away, lacking walls and windows, with a floor carpeted by small spruce branches over which blankets are laid to form beds disposed around a central, open fireplace.

In similar upland environments are found hunting cabins and the 'saeters' of lower farms. Originally the saeter system was a very important feature of the rural economy of the valley, with members of each farming family participating in the spring movement to small log cabins amid the open woods and pastures of the high fjeld, where cattle, goats and sheep could be grazed, cheese made, timber and berries collected, and, where the main farmstead was not too far distant, diminutive haystacks built in grassy clearings and protectively fenced about for winter fodder reserves. Since the close of the nineteenth century, however, as a result of the marked decline in the number of sheep in the valley and the growing tendency to keep milk cows at the home farm and entrust the young cattle to professional herders, the system has decayed and many of the saeters fallen into disrepair. A certain amount of acitivity is still found in the high pastures of Marstenen and Volhaugen west of Leksdal Lake, Juldal Common between Verdal and Indal, and in the vicinity of Lake Være where short moves are made to saeters at various lake-side pastures and up some of the side valleys, but in no case are large movements of population involved. Seasonal transhumance for pasture, which undoubtedly played a most important part in the opening up of the valley in historic and pre-historic times, has now been largely replaced by winter movement for employment in forestry in the upper valley.²¹

Farms with an appreciable amount of arable as well as pasture land are strictly limited in this high terrain to certain favoured areas such as Sulstua in the upper Inna valley, and the lakeside tracts of Være. In the former locality a dozen farms are sited on the gentler, south-facing slopes and gravel terraces overlooking the river in one of those rare stretches where it is not confined to precipitous rock gorges. In the Være locality a similar number of farms are located on lacustrine terraces, deltaic and fluvio-glacial materials, 20-30 ft above the present level of the lake (375 m.). Fig. 6 shows the land utilisation of a group of such farms on the south-eastern shores of Lake Være. They are

essentially small grassland farms won from the forest and peat-and-scirpus tracts by hard labour on clearance, root removal, and drainage. Soils are poor, ranging within short distances from intensely leached to water-logged, acidic conditions, and the growing season is short. Thus, although crops of potatoes, oats, and barley are grown, the former are often badly damaged by frost, and cereals harvested stunted and green, and the majority of the improved land of the farms is given over to hay production as indicated by the distribution of drying posts in the diagram. For this purpose the land is lightly ploughed every five years and resown with grass mixtures of timothy and red clover, as otherwise these grasses tend to be replaced naturally by *Agrostis* and *Poa*. Grazing and 'haying' rights are

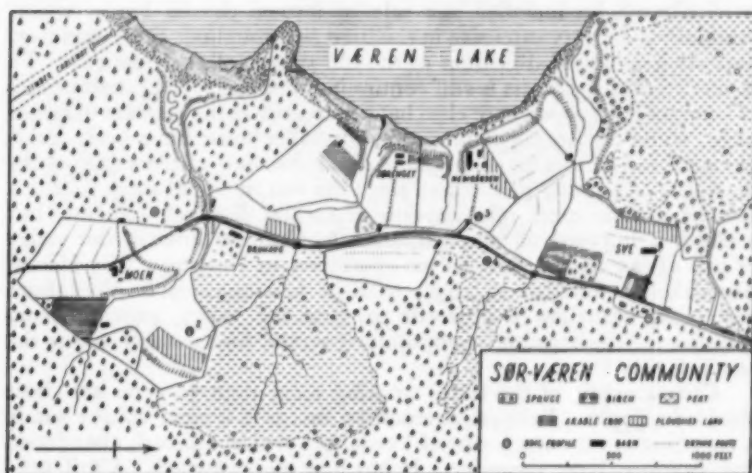


Fig. 6. Farmsteads and land use on the south-eastern shores of Væren Lake.
Soil profiles: 1. Humus podzol with gleyed A_2 horizon. 2. Cultivated peaty gley.
3. Cultivated podzolic gley. 4. Peat. 5. Podzol with white A_2 horizon.

held in the forests beyond the protective fences of the farm properties during the summer, and some grazing is available on the home fields during the autumn, but the need for copious supplies of winter fodder during the long close season is reflected in the size of the timber barns. A two-storied barn, with storage capacity on the upper floor made accessible by a ramp and accommodation below for animals and implements, and a long wooden dwelling-house set either at right angles or parallel to it, usually comprise the farmstead, but at least during the summer months the milk-cows are housed by night in a small shed on the perimeter of the farmland. Such farms carry about 8 cows, 5 sheep, a pig or two, a horse, and 10-20 poultry, and, along with subsidiary occupations such as lumbering, sustain about 6 persons per farm.

LOWLAND FARMS

In the lower valley, farm forms and land utilisation vary with the size of the farm unit, location, and soil type. By British standards the majority of the farms would be classed as small holdings, only 63 units out of a valley total of 969 holdings being over 50 acres (200 decares or dekarars).²² There are 168 farms holding 25-50 acres, 199 farms holding 12.5-25 acres, 328 farms holding 5-12.5 acres, and the remainder less than 5 acres. Although during the historical period farms have never been conspicuously large, the present position has been achieved largely through the process of sub-division of older farm units, which quickened in the seventeenth century and culminated in the middle of the nineteenth century. Among the factors facilitating this process must be included the sale of former church lands, which originally were very extensive in this area as throughout the Trøndelag, and the gradual modification of the old system of *odel* tenure.²³ To some extent this process is still continuing, and since 1939 the number of farms of the 12.5-25 acre class have increased at the expense of larger units, while at the same time several smaller units have been amalgamated to form farms of the same class. In view of the rapid mechanisation of farming in the area since the war, it would seem that this counter-process must gain impetus as capital demands increase, but a check is imposed on amalgamation by the operation in the valley of one of the largest farmers' co-operatives in Norway. The Verdal Samvirkelag, founded in 1892, with its headquarters in Verdalsøra and eight branches in different parts of the valley, provides many facilities for the farming community it serves, and notably assists the small, family farm.

Characteristic of the farms working more than 50 acres are those shown in Fig. 7. Fæby, first recorded in 1301, is sited on the sandy 9 m. terrace to the south-east of Verdalsøra within a broad, abandoned but swampy, river meander. It has had many owners. Until 1460 it was the property of the Bishop of Trondheim, then passed to the Cathedral Chapter, and after the Reformation was used as a means of paying teachers at the cathedral school in Trondheim. Not until 1762 did it become the property of the farmer. The present family purchased it in 1846, and although during the period 1890-1930 some 300 decares of the property were sold away, it still remains one of the largest farms in the valley, with 400 decares of woodland and 400 decares of cultivated land. The woodland, which includes about 50 decares high quality spruce timber, provides for all the farms needs and a surplus for sale. Of the cultivated land 50% was under corn in 1953, with 175 decares of barley and 25 decares of oats. Potatoes and swedes accounted for 50 decares, pasture for 50 decares, and meadow for 100 decares, of which 30 decares were double-cropped for silage. Normally a seven-course rotation is used: a year of oats, followed by a year of root crops, two years of barley, and three years of grass. Ploughing usually commences in April, and sowing and harrowing with liberal dressings of super-phosphate, potash, and nitrates in May. June is spent sowing for silage and weeding, and

towards the end of July the hay is cropped and hung out to dry on wires stretched between poles. Early August is used as the family holiday while the corn is ripening, and the latter part of the month for harvesting and drying the grain on stakes. In 1953 the water content of the grain was only 14.5%, but in the previous year it had been as much as 30%, and in this area is usually high, requiring extra drying at the granary where it is reduced to about 14%. In September and October the potatoes are gathered with the aid of labour from Verdalsøra, and as much ploughing is done as possible before the frost and snows begin. During the winter months the grain is threshed and

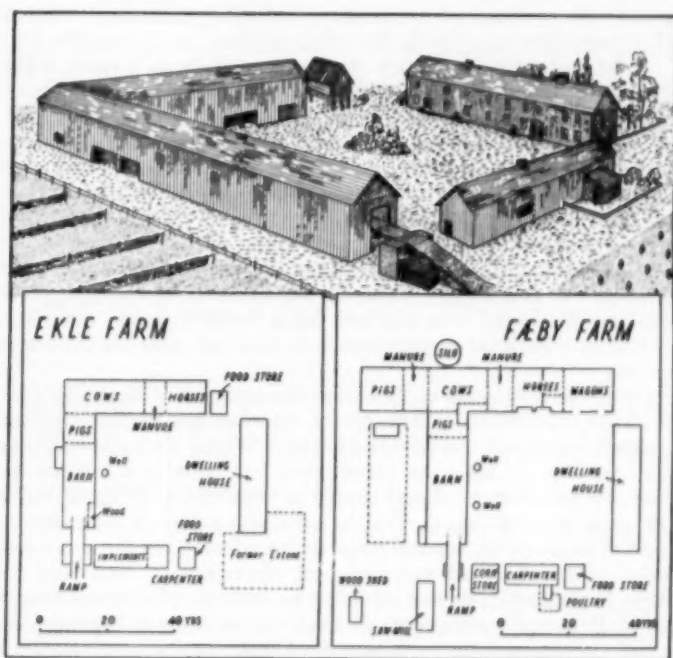


Fig. 7. Farm plans and composite diagram of a typical large courtyard farm.

some of the hay baled for sale, potatoes are sorted, timber gathered, repairs done, animals attended, and blocks of ice stored with wood chips in the concrete 'refrigerator' for use during the summer. Electricity is available from the district grid, to which the hydro-electric station at Ulvillå contributes power, and water is obtained under high natural pressure from the Verdalsøra waterworks, but originally was drawn from the base of the terrace sands by the wells indicated in the diagram. Farm stock includes 20 milk cows which per year supply Verdal dairy with just over 40,000 kg. of milk of 4.24% fat content, 4 breeding sows which produce about 40 pigs a

year for the Co-operative, 40-50 hens, 2 horses which are all that are left as a result of mechanisation, and 20 sheep which are soon to be disposed of entirely. Most of the work on the farm is done by the family with extra labour when required from adjacent smallholders.

In view of recent developments then, much space in the large buildings of the courtyard type farmstead is redundant—a feature which becomes even more apparent in those old farms where the process of fragmentation has gone further than in the case of Fæby. As timber is readily available and the close season long, however, the tendency on most Trøndelag farms has been to construct very large farmsteads in relation to the area farmed. At Ekle the size of the farmstead was reduced when the present family purchased it in 1898, thereby re-establishing closely the original plan, for during the greater part of the nineteenth century it was owned by a Danish military family who used it as the central farm for a number of properties given over largely to pasture. Ekle now cultivates 330 decares and in addition owns woodland, mainly alder thickets, on the low riverside area covered by clay during the 1893 landslide. The farmstead itself stands on the edge of the 9 m. terrace, and its sandy, arable land on the terrace is largely devoted to the cultivation of barley, with only 50 decares of potatoes and 80 decares of grass. As in the case of many of the large farms in the Stiklestad area, it originally drew its water from wells, but this supply dried up when the broad, marshy terrace overlooking Stiklestad was drained for a forest nursery, necessitating resort first to high-level springs and then to piped supplies from upland reservoirs.

On most of the farms of this class the practice of devoting 50% or more of the cultivated land to cereal, particularly barley, production is repeated wherever conditions permit. Where departures from the 'Fæby' pattern of land use occur, they can usually be traced to soil deficiencies which even liberal dressings with cheap artificial fertilisers can do little to counteract. On the northern slopes of the valley at an altitude of some 70 m. several large farms, located on the downwashed material of the Leksdal moraine and remnants of sand and gravel terraces, for example, devote a higher percentage of their land to grass. Thus, Hallem cultivating 200 decares out of a total holding of 250, uses 116 decares for the production of hay, 14 for roots, and 70 for cereals; Lein with a total holding of 1000 decares cultivates 230, of which 133 are under grass, 13 under roots, and 35, 25 and 24 under barley, wheat and oats respectively; and Forbrygd, farmed by a returned emigrant from Canada, devotes 135 decares to grass, 35 to roots, and 100 to cereals, including a little wheat, out of a total holding of 550 decares. Spring wheat production, which increased greatly in the years immediately preceding 1939, has now declined again, and its survival in these higher farms may be related to their sunny south-facing aspects and location above the danger zone of valley temperature inversions. It is significant that wheat cultivation was never popular with farmers on the southern flanks of the valley, and similar controls seem to be responsible for the larger proportion of grassland and unreclaimed forest on the north-facing slopes, particularly

of Helg  dal and Indal. Grassland and woodland also increase in area on the poorly drained soils of the ± 55 m. terrace and the recent alluvium.

On the smaller farm holdings the area devoted to hay production invariably increases in proportion to other uses. A farm cultivating 100 decares normally allots 60 to grass, 30 to cereals, 10 to roots, and supports 8 milk cows; one cultivating 50 decares assigns 35 to grass, 10 to cereals, 5 to roots, and carries 5 milk cows; and one cultivating 20 decares allocates 15 to grass, 2.5 to cereals, 2.5 to roots, and carries 2 milk cows. Thus the importance of grass increases as size decreases. Several small holdings in the lower part of the valley, however, are experimenting with slightly different crop combinations. One holding

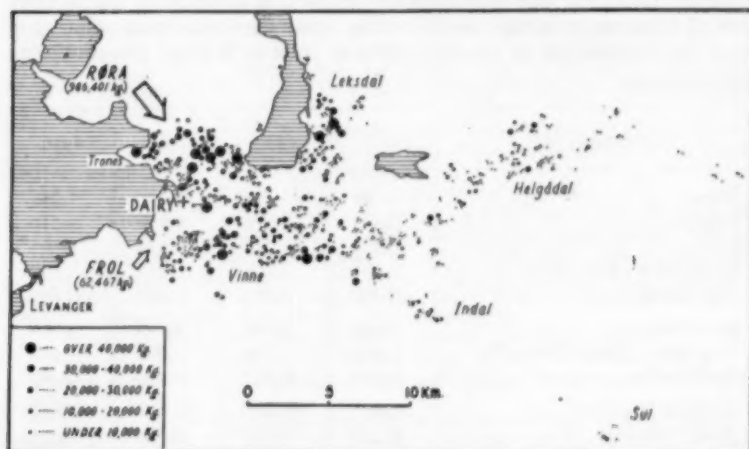


Fig. 8. Milk supply from individual farm units to the dairy in Verdal  ra in 1952, based on dairy accounts.

of 36.4 decares, for instance, produces no corn at all but in 1953 had 13 decares under potatoes, 4 under swedes, 5.7 decares producing green fodder for silage, and the remainder as meadow. This holding originated in 1898 as a fragment (No. 18) of the large farm of Hallem and in recent years has been associated with research projects on farm economics being carried out by the Agricultural Economics Institute of Oslo. Ten decares of its area are sandy, and the remainder reclaimed peat soils, thus affording an example of what can be achieved by an ordinary smallholder on such land in comparison to the experimental plots at Maere. A six-course rotation is followed, with three years potatoes, one year green fodder, and two years meadow. For potatoes 50 kg. of combined fertiliser is applied per decare, along with some ten cartloads of dung, while the meadows are dressed with 35 kg/da potash, 30 kg/da superphosphate, and 30 kg/da nitrates. In 1952 the holding produced 21 tons of potatoes; 10,283 kg. of milk with average fat content 3.91% to the Verdal Dairy (from 3 milk

cows); 25 pigs (from 2 Large White sows); and the eggs from 100 poultry. As in the case of most of the small holdings, the farmstead consists of a dwelling-house, food store, and single large outbuilding. Full employment is offered by such a holding, but the majority of smallholders supplement their income by work in the forests and sawmills, river conservancy, road construction, or, in the case of the many tiny holdings in the vicinity of Verdalsøra, in the various small industrial establishments within the township. However, as a result of the well-balanced rural economy, unemployment figures and financial distress are exceedingly slight.

In conclusion, Fig. 8, showing the sources of milk supplies to Verdal Dairy, offers at the same time an indication of the distribution of milk cows in the valley and thereby an approximate measure of the relative size of farm units, while the following table summarises the changing area and utilisation of the agricultural land of Verdal Commune in recent times.

DECARES IN	1917	1929	1939	1949
Wheat	42	17	3,075	1,943
Barley	5,325	8,579	9,990	9,520
Oats	9,375	9,079	6,239	6,301
Mixed Corn, Peas, Rye . .	261	195	102	36
<i>Total Cereal</i>	<i>15,003</i>	<i>17,870</i>	<i>19,406</i>	<i>17,800</i>
Root Crops	3,044	4,221	5,096	5,766
Vegetables, Green Crops, Etc.	463	764	767	917
<i>Total Arable</i>	<i>18,510</i>	<i>22,855</i>	<i>25,269</i>	<i>24,483</i>
Artificial Meadow	39,001	37,809	38,628	41,070
<i>Total Cultivated</i>	<i>57,511</i>	<i>60,664</i>	<i>63,897</i>	<i>65,553</i>
Natural Meadow	6,194	3,825	3,762	3,235
Mown Outfields and Saeter .	2,806	3,354	2,664	728
<i>TOTAL AGRICULTURAL</i> . .	<i>66,511</i>	<i>67,843</i>	<i>70,323</i>	<i>69,516</i>

It will thus be seen that the present variations of farm morphology and land utilisation in Verdal conform closely to the vertical differentiation of the valley environment, preserve many elements springing from the forest frontier on which the community had its origin, and to a considerable degree express in spatial terms a long time-series of farm evolution.

Photographs 1, 2, and 4, by E. A. Fitzpatrick; 3, by C. H. Gimingham.

¹ OLSEN, MAGNUS. *Farms and Fanes of Ancient Norway*. Oslo, 1929. p. 15.

² For an historical description of the Trøndelag see F. N. STAGG, *The Heart of Norway*, London, 1953.

³ Comprising members of the staff and students of the Botany, Forestry, Soil Science and Geography Departments of Aberdeen University, to all of whom grateful acknowledgements are due.

⁴ Cf. SÖMME, A. The Physical Background of Norwegian Agriculture. *Geography*, 1950, 35 : 141-154.

⁵ See ÅNGEBY, O. Landformerne i NV Jämtland och angränsande delar av N Trøndelag. *Lund Univ. Geog. Inst. Av. 12*, 1947; REUSCH, H. Nogle bidrag til forstaaelsen af hvorledes Norges dale og fjelde er blevne til. *Norges Geologiske Undersøgelse Aarbog*, 1900; AHLMANN, H. W. Geomorphological Studies in Norway. *Geografiska Annaler*, 1919, 1: 3-148, 193-252; STRÖM, K. M. The Geomorphology of Norway. *Geographical Journal*, 1948, 112. HOLMBEN, G. Fortsaettelsen av Trondhjemsfeltets kisdag mot Nord. *Norsk Geologisk Tidsskrift*, Bd. V, 1918.

⁶ Cf. OYEN, P. A. Kvartaer-Studier: Trondhjemsfeltet. *Det Kongelige Norske Videnskabernes Selskabs Skrifter*, 2. 1915. HOLTEDAHL, O. Om Land-isens Bortsmeltning fra Strøkene ved Trondhjemsfjorden. *Norsk Geografisk Tidsskrift*, 1928, 5.

⁷ Cf. HOLMBEN, P. Landslips in Norwegian Quick-clays. Excerpt from *Geotechnique*, March, 1953, published by Inst. Civ. Eng. 1953. REUSCH, H. Nogle optegnelser fra Vaerdalen. *Norges Geologiske Undersøgelse*, 1901, No. 32.

⁸ See BRØGGER, A. W. The Prehistoric Settlement of Northern Norway. *Bergens Museums Arbok*, 1932. GJESSING, G. *Tyngre Steinialder i Nord Norge*. Oslo, 1942. *Id.* Circumpolar Stone Age. *Acta Arctica*, II Copenhagen, 1944. *Norges Steinialder*. Oslo, 1945. Brøgger's interpretation of the diffusion of Arctic art must be reconsidered: see J. MARINGER and H. G. BANDI, *Art in the Ice Age*. London, 1953.

⁹ CLARKE, J. G. D. *Proceedings of the Prehistoric Society*, 1948, No. 9: 219-232.

¹⁰ MØLLENHUS, K. R. Trekk fra Nord Trøndelags forhistorie. *Nord Trøndelags Historielags Aarbok*, 1950.

¹¹ STEENBERG, A. N.W. European Plough Types of Prehistoric Times and the Middle Ages. *Acta Archaeologica*, 1937, VII. Ancient Harvesting Implements. *Nationalmuseets Skrifter*. København, 1943.

¹² SHETELIG, H., and FALK, H. *Scandinavian Archaeology*. 1937.

¹³ Cf. ARBMAN, H. Germanischer Wohnbau in Schweden. In: *Haus und Hof im Nordischen Raum*, Leipzig, 1937; ERIKSON, S. Svensk Kulturgeografi från etnologisk Synpunkt. *Svenska Kulturbilder*, 9. Stockholm 1931. VISTED, K., and STIGUM, H. *Var gamle Bondekultur*. Oslo, 1951. Vol. 1, p. 11 ff. and ct. the longhouse type of farmstead in Western Norway in: HAGEN, A. Studier i Jernalderens Gardsamfunn. *Univ. Oldsaksamlings Skrifter*, IV. Oslo, 1953.

¹⁴ RYGH, O. *Gaardnavne i Nordre Trondhjems Amt*. Kristiania, 1903.

¹⁵ e.g., *Aslak Bolts Jordebog* [P. A. MUNCH (1430-1440)]. Christiania, 1852.

¹⁶ VON BUCH, L. *Travels through Norway and Lappland during the years 1806-7-8*. London, 1813.

¹⁷ The outcome of a system of national defence first outlined by King Haakon I (the Good) in the tenth century. Each of the territorial units known as 'skipreida' or 'shipredes' was obliged to supply, equip and man a warship of prescribed size. Later, this was converted into an annual land tax on the farms within each unit. Cf. English 'ship-money'.

¹⁸ Many of these records in: *Verdalsboka*, Vols. 3, 4, 5. Trondheim, 1930.

¹⁹ See e.g. HOVD, A. Experiments with different applications of fertilisers to leys on peat soil. *Det norske Myrselskaps Forsøksstasjon. Mære. Melding*, No. 35, 1950.

²⁰ See ALLIBON, A. C. The Lapps: Origins and Affinities. *Geographical Journal*, 1953: 315-320.

²¹ Cf. FRÖDIN, J. Fäbodbebyggelsen i Kall och Offerdal. *Geografiska Annaler*, 1919, 1: 353-386. See also: SÖMME, A. Norwegian Agriculture and Food Supply. *Geography*, 1950, 35: 215-227.

²² i.e., total holdings larger than 5 decares (4 decares=1 acre).

²³ 'Odel' or 'udal' tenure includes the right of kinsfolk to recover within a specified period a farm property that has been sold out of the family, and has been one of the greatest factors promoting continuity in Norwegian peasant cultures. The first recorded modifications of the original system in Verdal resulted from Nicholas Breakespear's insistence in 1153 that the Church should be allowed to inherit up to one-tenth of a deceased's hereditary land.

THE GEOMORPHOLOGY OF THE EAST CHEVIOT AREA

By ROBERT COMMON

LYING at the eastern end of the Border hills, the Cheviots look down on Teviotdale and Tweedside to the north but, in contrast, are backed by bleak moors and fells about Redesdale to the south. To the east, they are separated from the coastal plain by one major and two minor cuestas, developed on sedimentary rocks and disposed roughly *en échelon*. Whilst The Cheviot (2676 ft) dominates the surrounding country (Fig. 1), its summit is truncated and is now virtually covered by bleak, cheerless peat. Looking westwards from this summit the observer is impressed first by the ridges and incised valleys falling away northwards from the principal watershed, then by the still lower



Fig. 1. The Cheviot area: location diagram.

summit-levels of Lower Teviotdale, above which igneous masses rise in places. Immediately south of and parallel to the Border, in Upper Coquetdale, a trough of relatively lower ground is drained by deeply incised streams, but further afield to the south-west, the tabular out-lines of sandstone fells appear. To the south of Cheviot, both Cushat Law and Bloodybush Edge stand as monadnocks upon plateau fragments, and beyond the Cementstone vales of the Aln and Mid Coquet the overlying sandstones form an imposing scarp face. In the eastern half of the Cheviots, relics of erosion surfaces give rise to a bold, stepped sky line. In the NE sector these steps are more numerous than in the SE sector, where breaks of slope are therefore greater. Again, from the same vantage point on Cheviot, the inward-facing,

occasionally multiple, sandstone scarps can be seen sweeping round from near Rothbury, to the east and then northwards. In this traverse, too, the tripartite division of the Cementstone area into basins becomes apparent, with the lowest of them—Milfield basin—forming an appendage to the Merse drumlin area. Beyond the major cuesta, to the east, the inward-facing Whin crags of the Farne Islands and Budle are just visible, whilst the Longridge to the north can also be seen.

In the core area (Fig. 2) lies a mass of Lower Old Red Sandstone lavas, representing the denuded remnants of a volcano which originally must have been comparable in size to the present Mount Etna. Sub-aerial in nature, the lavas are now limited in the north and south flanks by boundary faults, and, whilst they pass under Carboniferous sediments to the east, the base of the series and underlying Silurian

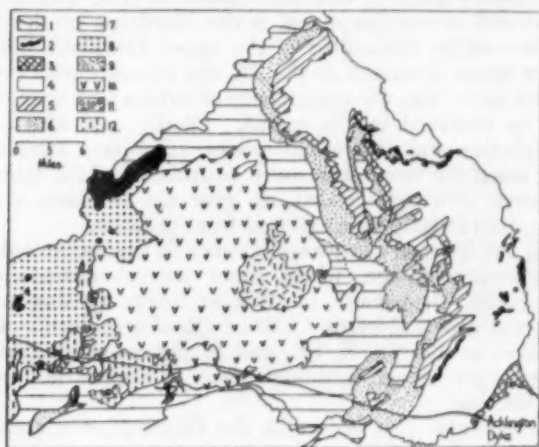


Fig. 2. Solid geology of the Cheviot area.

1. Tertiary dyke. 2. Carboniferous igneous rocks. 3. Millstone Grit and Coal Measures. 4. Carboniferous Limestone Series. 5. Scremerston Coal Measures. 6. Fell Sandstones. 7. Cementstones. 8. Upper Old Red Sandstone. 9. Granite. 10. Andesitic O.R.S. lavas. 11. Lower Old Red Sandstone. 12. Silurian.

sediments are exposed on the high ground to the west. Within these lavas and extending to about 22 square miles of Northumberland is the Cheviot granite. Originally interpreted as a laccolith, this granite is now considered to be a replacement and, probably, it occupies the major vent of this ancient volcano. Subordinate, but nevertheless responsible for many minor features in the field, are the various types of porphyrite dykes. These form two swarms, aligned NNW and NNE respectively, and also pierce the granite.

The bulk of the lavas are andesitic, although felsite, ash and agglomerate also occur; as might be expected, the different igneous rocks vary in their resistance to subaerial denudation. Ashes weather in rough, irregular fashion, weathered agglomerates show knotty surfaces, whilst glassy andesites weather into smooth-faced angular

blocks with a tendency to exfoliate. Again, whilst the andesites about Cheviot granite form an aureole of tougher, grey rock, north of the River Glen the alternating hard and soft flows correspond to ridges and troughs in the present landscape. The granite, too, is variable, and although its outcrop area is broadly coincident with the highest ground, this is by no means a hard-and-fast rule.

In this igneous complex two fault and crush systems are recognised, an older NNW and NE system together with a younger W-E system. Associated with these are two crush-breccia types: a quartzose type which is resistant to erosion and tends to form minor upstanding features, and a less resistant calcitic type now generally associated with gullies and depressions. Without doubt the effectiveness of crushes in influencing present topography can best be demonstrated about Scotsman's Knowe, one mile south of The Cheviot. Here, running SW-NE across the massif is the Harthope crush—traceable for 15 miles—whilst the valleys of the upper Davidson Burn to the SW and the upper Breamish to the SE also coincide with crush lines. On a smaller scale, too, the coincidence of stream and crush lines may frequently be observed in the massif. Finally, one also notes how circumdenudation and differential erosion rates have produced fault-line scarps along the north and south boundaries of the igneous area. These features, although eroded, do give the Cheviots a horst-like appearance, particularly when viewed from the east.

Girdling the igneous complex in crescentic fashion lie sediments of Lower Carboniferous age, whose inner margin extends eastwards from near Kelso, then south by Wooler before turning westwards, then north-westwards towards Chesters (Roxburghshire). Outwards from the lavas to the NE, E, SE, and S, the sediments become progressively younger in age, although there is duplication to the east because of faulting.

Igneous material also occurs in the Carboniferous area, and, as with the Old Red Sandstone, there is much variety in type and distribution, for whilst Lower Carboniferous plug and trap rocks lie in the horns of this crescent, Upper Carboniferous dyke and sill intrusions occur in the E and SE of the area.

The sediments are mostly arenaceous, but shales and limestones, though subordinate, are common, whereas marls and thin workable coals are restricted. The basal Cementstone group—like the Scremerston Coal Measures—shows a facies change when traced southward, and although the Tweed, Till, upper Aln and Mid Coquet valleys lie in rocks of this group, it also forms bold ridges in the upper Aln valley—the Glanton ridge and Wandystead ridge. The Fell Sandstones which overlie the basal group are responsible for the most striking topography in the sediments. Massive sandstone is characteristic, with strongly developed vertical and horizontal jointing frequently to be seen, e.g., Kyloe Hills, St Cuthbert's Cave. Whereas the sandstone is finer and less resistant in the north, shales become important enough to divide the group into three in the south, thus forming a triple line of crags along the right bank of the Aln: at Callaly, Lorbottle and Edlingham, with each corresponding to the sandstone. Above the Fell

Sandstones come the Scremerston Coal Measures and the Limestone group which both contain thin workable coals, shales and limestones—but all subordinate to sandstones. These latter occasionally are associated with craggy landforms, but except in stream courses and coastal sections the limestones rarely produce distinctive natural features.

The present structural arrangement of the area (Fig. 3) is believed to be predominantly Hercynian in origin, with the faulted and folded Carboniferous sediments adjacent to the Cheviots bounded by the Tweed trough to the north and the Rede trough to the west. Structural causes have been suggested for both troughs by Gregory and Hickling, respectively. Here lie the two large asymmetrical anticlines of Holburn and Lemmington, both fault-bounded on, and with steepest limbs to, the west. The Holburn anticline trends and pitches northwards, being separated from the adjacent Hetton syncline by the Hetton

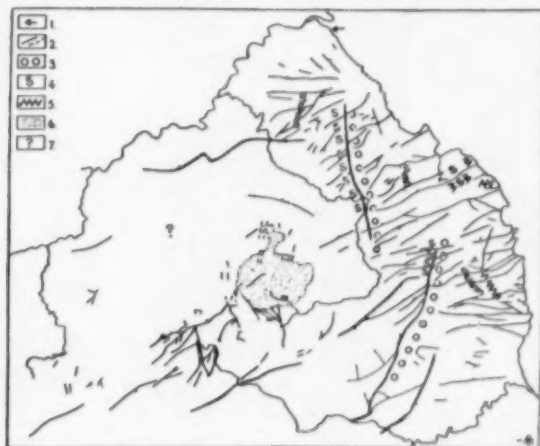


Fig. 3. Geological structure of the Cheviot area.

1. Unconformity. 2. Faults, crush-lines. 3. Large anticline.
4. Syncline. 5. Small anticline. 6. Granite area. 7. Information uncertain.

fault. Southward, this anticline dies away but is almost immediately replaced by the Lemmington anticline, whose axis is aligned SSW-NNE. This anticline is not accompanied by a complementary syncline west of the Bolton fault, but by splay faulting. In addition to these large folds, minor flexures occur, especially in the SE, but these do not appear to make significant contributions to the present landscape.

The general fault pattern alters when traced from north to south. North of the Holburn anticline, the faults converge fanwise on Haggerston, but southwards the characteristic alignment becomes NE-SW and throws increase considerably—Chillingham fault, for example, has a 1000 ft throw. Further south still, over and east of the Lemmington anticline, fault-line alignments vary between ENE and ESE, but the splay faults coming off the Bolton fault to the west show south-westerly trends.

Whilst the coincidence of the anticlines and high ground, and the relationships of the Hetton and Coe valleys to the Hetton and Bolton faults are immediately evident, a closer examination of landscape details shows still further the intimate relationship between fault-line and topographical feature, e.g., along the cuesta scarp-faces, the site of the Aln water gap. Several of these fault-lines, too, have determined the spread of the Whin Sill. This sill is a quartz-dolerite of late Carboniferous age, and where present in the landscape it seldom fails to create bold topography.

Difficult though it be, at times, to visualise the processes operative in more favoured areas, here in the Cheviots there is a gap in the geological record from Upper Palaeozoic to Quaternary times.¹

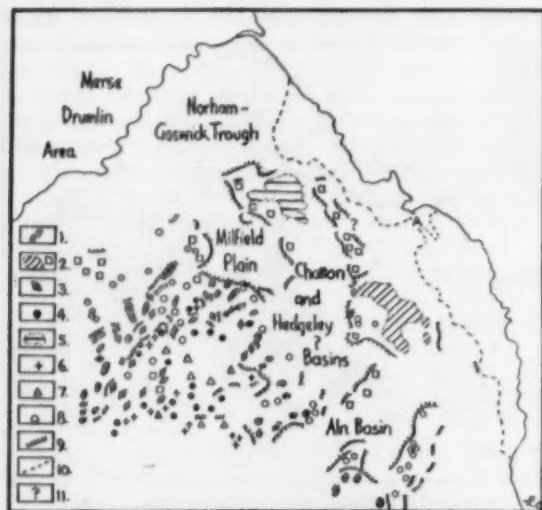


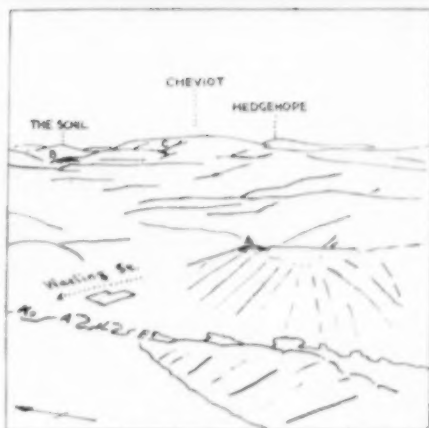
Fig. 4. Major topographical elements.

Fragments of erosion surfaces and valley stages are numbered from 1 to 8 in the key. Height ranges of each are: 1. 950-1200 ft. 2. 500 ft./550-750 ft. 3. 1300-1500 ft. 4. 1550-1700 ft. 5. 350-600 ft. 6. 1750-1850 ft. 7. 2000 ft.+. 8. 800-900 ft. 9. Topographical break. 10. Coastal plain. 11. Area of uncertainty. A=Lucker trough.

However, by way of compensation, the observer is provided with a more complete record of the later stages of glaciation, in the form of deposits and modifications to pre-existing drainage lines and meltwater channels. Whilst it is recognised that past climates would produce variations in the efficiency of subaerial denudation agents acting in the area, this aspect has so far only received preliminary consideration. Yet might not the landscape be described also as composite—in so much as it has been subjected to more than one climatic régime? With these considerations in mind, it will be apparent that for the present only a tentative denudation chronology can be suggested for



The Cheviots from the south-west, under a light powdering of snow. The truncated Cheviot summit, gashed by the Hen Hole (C), dominates the older plateau remnants on the right, along which runs the main watershed, and above which rise monadnocks like Hedgehope and The Schil. The centre and left middle distance is occupied by deeply dissected terrain occasionally isolating summits like Woden Law (A). Prominent features developed on lavas can be distinguished on Fasset Hill (B). The foreground is crossed by the mature valley of Kale Water, in which the stream meanders along a narrow flood-plain, carved in the coarse glacial deposits.





In the Coldgate valley looking west to The Cheviot, whose summit appears left of the pines in the foreground. Typically smooth grassy hill slopes, stream meandering and braiding in coarse detrital deposits.

the area, although the presence of erosion surface fragments² has been demonstrated both in the field and by the use of graphical methods.

At present the land-surface, whose major elements were already fashioned in pre-glacial times, is subjected to subaerial denudation under normal conditions. But even so, from the evidence of wasting peat-hags on the higher parts of the massif, there appears to have been climatic amelioration within comparatively recent times. As for the coast, the writer believes that the present sea-level is of comparatively recent origin and relatively higher than that of pre-glacial times. The views of Anderson and Woolacott, who independently suggested late or post-glacial sea-levels of 200 ft O.D. and 150 ft O.D., are now supported, whilst the recorded fragments of submerged 'forests' along the Northumbrian coast are cited as further indicators of change in sea-level. The coast is interpreted here as being a submerged type which has been subjected to oscillations of sea-level. These have led to partial emergence, so that the present coast is now in a youthful stage.

Examination of areas of gentle slope in the higher ground shows that these are, in fact, remnants of distinct erosion surfaces now mapped for the first time. As the map of erosion surfaces (Fig. 4) will demonstrate, there is a greater number of fragments on the igneous massif than on the cuestas, and it is on the massif alone that the older surfaces are seen. As already mentioned, they are best preserved in the northern and eastern parts of the massif where the relief rises in terraces into the core with 'treads' separated by 'risers' of about 200 ft height.

The following three surfaces are easily recognisable :

- (1) *950 ft/1000-1200 ft.* Though reduced in places to the ridge state, fairly extensive remnants remain.
- (2) *750-550 ft/500 ft.* Also reduced to the ridge state on the massif.
- (3) *1300 ft-1500 ft.* Remnants of this surface are most striking in the north-west, and it is suggested that southward retreat of the principal watershed was early accomplished.

Between 1550 ft and 1850 ft there seem to be two surfaces, viz :

- (4) *1550 ft/1600-1700 ft.* Remnants of this surface occur on, or just south of, the principal watershed.
- (6) *1750 ft-1850 ft.* In the core of the massif there are numbers of accordant summits, a plateau remnant SSE of Cushat Law, and a marked topographical break at 1750 ft. These, however, are much less pronounced than the three above mentioned. In addition, three further groupings of summit heights may be significant.
- (7) *2000 ft and over.* Few summits occur at this height within the area and, therefore, there can be no certainty as to the former existence of an erosion surface. The contrast, however, between the group of summits at 2000 ft and those at 2350 ft is noteworthy.
- (8) *900 ft-800 ft.* Any surface at this level has now largely been removed, but its former existence is suggested by summit accordance on the foothills of the Cheviots.

Monadnocks are commonly encountered, indicating that higher surfaces were formerly of greater extent, and again within the major valleys bench remnants occasionally have been preserved. Dissection of this ground to the ridge state is common north and west of the College Burn, but eastwards the degree of stream dissection is less. To the south-east a wedge of relatively low ground is driven westwards into the heart of the massif. From the apex a former high valley line can be traced between Lintlands and Linhope, whilst further east the present Breamish is incised into a plateau-like surface at a lower level, No. (1) above mentioned, which has its best development here.

Of the surfaces described for the massif the following also extend on to the sediments :

- (1) 950 ft/1000-1200 ft.
- (2) 750 ft-550/500 ft. This surface is plainly seen in the Quarryhouse moor area.
- (8) 900 ft-800 ft. Like (1), remnants of this surface become more numerous southwards on the major cuesta.

In addition to these is the lowest surface of all :

- (5) 350 ft/550-600 ft. Clearly seen on Bar Moor between 350 ft and 400 ft. Fragmentary evidence from the head of Milfield Plain suggests an upper limit of 550-600 ft.

The Longridge to the NE of the massif probably served as a divide between the lower Whiteadder and Tweed in pre-glacial times. South of it, now, there is first a limited eastward extension of the Merse drumlin belt, and then the ground rises on to the minor and major cuestas. Both cuestas show steep, though irregular, west-facing scarp fronts whose northward lowering crest levels—i.e., north of Ros Castle on the major cuesta—have been severely modified by ice erosion. Because of the incomplete bevelling of summits, an observer now viewing the cuestas from the east sees the scarp front crests upon ridge-like or hogback features which rise above the general level of Bar Moor and Holburn moss in the north. Southward, on the major cuesta, summit-levels increase, with odd residuals in the west rising above a partially eroded 750-550 ft/500 ft surface. Here the low, undulating relief of Quarryhouse moor shows peaty deposits in ill-drained sites and duplicates the characteristics of the Bar Moor and Holburn moss areas, but pronounced glacial graining diminishes to the south-east. South of the River Aln, because of structure and the state of dissection there is multiplication of inward-facing scarp fronts, and summit-levels increase still further to the south-west. Along the whole length of the eastern flank of the cuesta, slopes generally are steep, although small 'treads' occur southwards—e.g., near Adderstone, south of Warenford and, more extensively, near Rock.

The extent of the coastal plain in the north is restricted by the Longridge, the major cuesta and the ice-eroded Whin Sill crags running eastward to Budle Point. Again, whilst the seaward end of Longridge is being actively eroded, forming unstable cliffs and wave-cut features, low depositional coastal features are seen to the south. Beyond Budle

Point to Howick it is the Whin Sill which produces bolder coastal features, although low sea-cliffs occur on the arched sediments at Seahouses. Interspersed along this stretch there are numbers of restricted alluvial flats behind blown sand deposits, and several extremely interesting geological sections. Inland, a pocket of low-lying ground about Belford lies adjacent to a trough of low ground stretching southwards from Warren Mill, but otherwise the coastal plain is undulating. From Howick to Alnmouth the absence of the Whin Sill is reflected in the low-cliffed coastline, whilst inland it is the Whin which forms the inner limit to the coastal plain in the Littlehoughton area (Fig. 5).

It will be obvious, therefore, that the present landscape is only partially adjusted to structure. Major and minor elements in the present topography are as much due to processes which were interrupted at intervals and which followed the dictates of climatic changes.

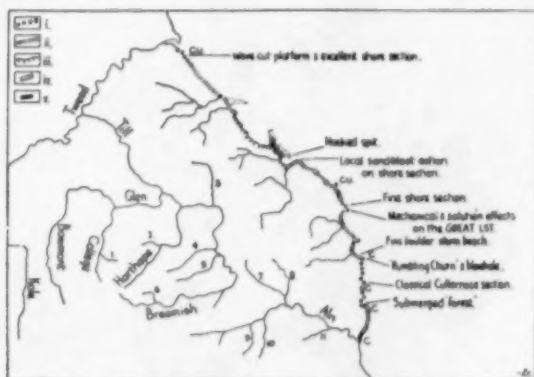


Fig. 5. Coastline features and stream nomenclature.

- i. Bedrock. ii. Blown sand. iii. Till-banking. iv. Bedrock and superficial deposits. v. Drift. C=Cliffs. CU=unstable cliffs.
1. Lambden. 2. Carey. 3. Hetton. 4. Lilburn. 5. Roddam.
6. Linhope. 7. Eglingham. 8. Shipley. 9. Coe. 10. Edlingham.
11. Cawledge.

Thus, whilst the area is almost in a state of mature dissection, it is essential to qualify this statement by noting that remnants of older erosion surfaces do remain on the higher ground of the Cheviots proper.

In Pleistocene times the erosional and depositional processes of ice moving over the area were most important, especially the latter on the low ground (Fig. 6), but conditions favouring severe weathering on the massif during late Pliocene, Pleistocene and early Holocene must not be neglected. It is considered that ice did not override the highest Cheviot summits at maximum glaciation, nor did The Cheviot form a centre of ice accumulation and dispersion. Along the east side of the massif the ice-level appears to have attained 1700 ft-1750 ft, and above this height the numbers of shattered tors probably result primarily from multiglaciation under periglacial conditions—e.g., the Standrop tors, on The Cheviot also. Between 1700 ft and 1000 ft there are

numbers of crags which, probably, were covered by ice for only a relatively short period. They, too, are markedly weathered and generally show alignments consistent with ice-flow directions. To explain the peculiarities of the glacial deposits in the massif, the writer suggests that a period of deep weathering preceded that of maximum glaciation. The rock waste so produced was removed by ice, and although the bulk of this detritus was carried afield, some of it would be deposited in the valleys. This incoming and overriding ice which caused erosion of obstacles and 'bottlenecks' in the line of flow must originally have been clean, for 'foreign' erratics are absent from the massif proper,

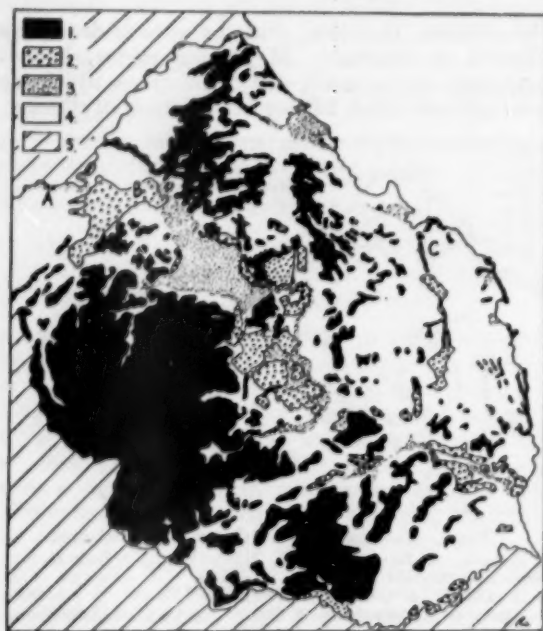


Fig. 6. Drift geology. (Peat not shown.)

1. No glacial deposits. 2. Fluvio-glacial sands and gravels. 3. Alluvium. 4. Glacial till. 5. Not considered. A. Wark Kaim. B. Pallinsburn Kaim. C. Bradford Kaim.

appearing only on the margins at lower altitudes. Judged by the minor landforms produced by glacial erosion—especially in the Bowmont and College valleys—and the variability of valley forms within the Cheviots, it appears that during maximum glaciation the upper ice layers moved in directions independent to those of the lower layers, while some form of glacial protection occurred in the valleys proper. At a later stage, a series of well-developed melt-water channels (Fig. 7) was cut round the east end of the Cheviots from Upper Coquetdale into the Bowmont valley. These, together with the variable and often considerable thicknesses of drift deposits in the Till, Breamish and Aln valleys, seem to indicate a halt or retardation

in the rate of ice recession. Evidence of pro-glacial lakes is variable and generally poor, but former levels of about 500 ft in the Bowmont valley and 400 ft in the College valley are suggested. Much more probable, however, is a 300 ft lake-level in the Hedgeley-Chatton basin (with an associated delta between East Lilburn—New Bewick—Wooperton) and also at the same height in the mid Aln valley. On the other hand, the 200 ft and 150 ft 'Lake Ewart' levels in Milfield Plain (cf. Fig. 4) are now considered to be of late or post-glacial date and not lacustrine in origin. To seaward, erosion by ice deflected southward has been especially severe on features lying transverse to the direction of ice-flow, e.g., the sandstone scarp crests and the Whin Sill; but elsewhere, with rock strike and/or pre-existing features



Fig. 7. Distribution of meltwater channels.

1. Meltwater channels. 2. Doubtful channels. 3. Scarped sediments. 4. Kale-Bowmont diversions.

correctly aligned, the ice has merely accentuated the topographic graining, e.g., near Embleton. Thicknesses of overburden show considerable range on the coastal plain too, but in contrast to the inland vales the volume of drift deposits is smaller and takes the form of a chain, i.e. the Bradford Kaim and continuations. The form of the drift deposits and the minor set of meltwater channels on the cuesta dip-slope presumably date from the time when ice retreating northwards along the coastal plain had become separated from stagnating ice in the Cementstone vales to the west.

Small discontinuous benches, possibly due to periglacial conditions, exist in the College and Bowmont valleys (cf. Fig. 7) together with solifluction products in the upper reaches of most valleys. As yet no

patterned ground due to frost action has been examined, and one wedge feature in the Thrunton Tileworks Lake Clays (mid Aln valley) might be interpreted equally as a 'washout' as due to frost action. There are nivation hollows on the higher ground, but the writer does not accept the Bizle or Henhole on The Cheviot to be corries. Instead, they may be relic features subsequently modified by nivation, or entirely due to nivation.

Prior to glaciation the land surface had already reached a state of near maturity, but by epicycles rather than by one or more uninterrupted cycles. Yet, although much of the relief is adjusted to structure (Fig. 8), interruptions to denudation have allowed fragments of higher erosion surfaces to be preserved on the tougher rocks of the igneous massif. At present it is a matter of opinion whether these higher bevels—i.e., above the 1000 ft-1200 ft surface—are considered subaerial or marine in origin, normally developed or pediments produced under more arid conditions. Moreover it is possible that the surface now between 1750 ft and 1850 ft represents the exhumed base of Permian rocks formerly covering the area.

Despite the importance of quasi-horizontal lines in the distant view of the Cheviots, the bulk of the massif has a steeper slope owing to dissection by rivers and modifications by glaciation. The present pattern of the valleys and their form appears to be most satisfactorily explained by the following sequence of events before and after glaciation. On the north side of the massif, it is suggested that streams originally flowed from south to north and were parallel. Unequal rates of headward extension and the preservation of higher residual areas—especially about The Cheviot—because of structure and interruptions to process, have led to the emergence of a radial pattern at the east end of the massif. Again, whilst the lower courses became increasingly adjusted to structure in the stages following the formation of the 1000 ft-1200 ft surface, further abstraction and capture probably occurred in pre-glacial times. More recently the lower stretches of Kale Water, Bowmont Water, and Kilham Burn have been diverted by ice and by glacial deposits: indeed, the former appears to have been temporarily diverted eastwards and later permanently westwards. Some may question the evidence for these diversions, but the glacial deposits 2 miles SE and S of Cornhill are of the order of 100 ft in depth, concealing part of the pre-glacial courses of the Kale and Bowmont. Moreover, an examination of the deep cuttings near Wooler will demonstrate convincingly the eroding capacity of meltwater.

South of the River Glen the sequence of events is more difficult to discern because there is little reliable evidence, and some of this is subject to alternative interpretation. One factor primarily decides whether the interpretation offered stands or falls: the acceptance of the supposition that a watershed formerly joined the Ros Castle (1036 ft) monadnock to the igneous massif. It is considered that during the cutting of the 1000-1200 ft surface, the College Burn from flowing northwards shifted its lower course monoclinaly. Subsequently, a tributary cutting back eastwards from the College Burn along the lava-Cementstone junction is believed to have captured successive

streams, up to and including the Harthope Burn, which were tributaries of a northward-flowing, fault-guided Hetton Burn. Meantime, south of the Ros Castle divide an eastward-flowing Breamish stream possibly was joined by two SE-flowing left-bank tributaries, one from the Threestoneburn basin and the second flowing over part of the present Hedgeley basin (Rosedean-New Bewick?). At this period the Aln is considered to have been a right-bank tributary, a strike subsequent guided in part by the line of the Bolton fault to a confluence point on Longlee Moor, near South Charlton. The lower Breamish probably flowed east through the site of the present Eglington gap to pass north of the site of Rock—along the line of the Rock fault—until the

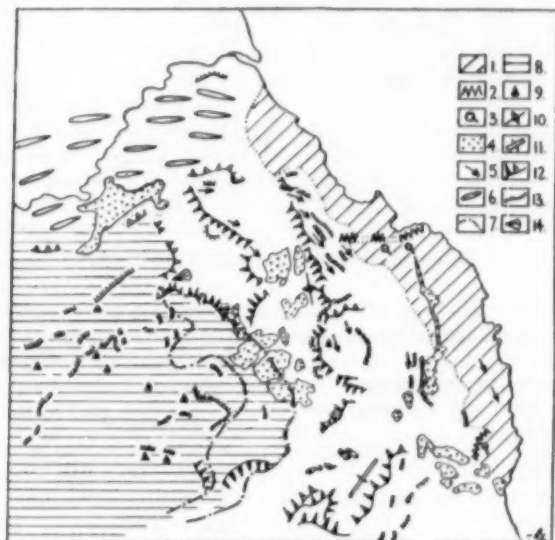


Fig. 8. Geomorphology of the Cheviot area.

1. Coastal plain. 2. Severely eroded Whin Sill crags. 3. Crag-and-tail. 4. Fluvio-glacial sands and gravels—undulating topography. 5. Glacially grained topography. 6. Drumlin belt. 7. Chief meltwater channel tract. 8. Igneous massif (dissected). 9. Monadnocks of note. 10. Axis of Holburn anticline. 11. Axis of Lemmington anticline. 12. Scarp or severe slope. 13. Marked topographical break. 14. Milfield Plain delta.

completion of the 750-550 ft. stage. Break-through of the Ros Castle divide from the north, with capture and realignments of the Breamish and Hetton, was accompanied by diversion of the former Aln to the south, effected by a dip-slope tributary of the Coquet which extended its headwaters over the faulted area near Hulne.

The effects of structure and process have already been indicated for the Bowmont, College and Harthope streams, and although the original alignment of the Breamish is problematical, its upper valley is in part coincident with a 'crush', and in part, with the granite-lava junction. All these streams show deep and well-established valleys

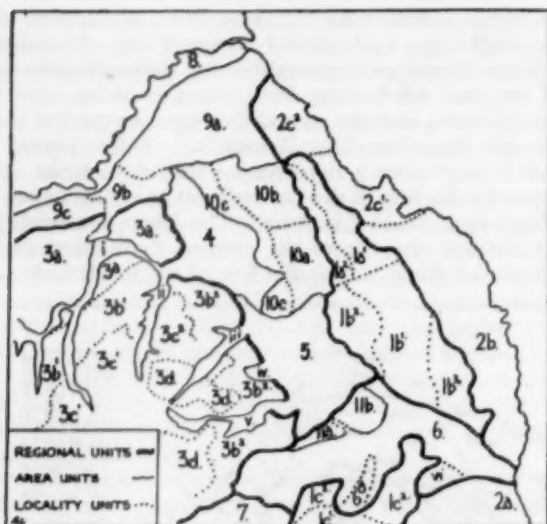


Fig. 9. Physical units of the east Cheviot area.

Major cuesta :

- 1a¹ Bevelled cuesta : glacial erosion and deposition.
 1a² Ice-grained scarp crest and scarp.
 1b¹ Glacial erosion and deposition about Quarryhouse Moor.
 1b² Higher residuals : ice-grained scarp crest and scarp.
 1b³ Lower summits : less compact topographically.
 1c¹ Increased summit heights above scarps. Bleak aspect.
 1c² Glacial erosion and deposition : summits lower than 1c¹.

Coastal plain :

- 2a Tract south of Alnmouth.
 2b Belford-Alnmouth tract.
 2c¹ Beal-Belford tract.
 2c² Eastern continuation of drumlins to Haggerston flats.

Igneous massif :

- 3a Ridge and furrow topography. Foot-hill tract.
 3b¹ Intermediate heights : dissected to ridge state.

- 3b² Intermediate heights : plateau-like.
 3c¹ Higher summits : dissected to ridge state.
 3c² Higher summits : plateau-like+residuals.
 3d Upstanding core remnants.

Valleys and basins :

- 4 Milfield Plain : i. Bowmont. ii. College.
 5 Hedgeley Basin : iii. Harthope, iv. Threestone. v. Breamish.
 6 Aln : vi. Cawledge.
 6a Newtown ridge.
 7 Mid Coquetdale.
 8 Tweedside.

Drumlin area :

- 9a Includes Norham-Goswick trough.
 9b Superimposed drifts near Cornhill.
 9c NE 'graining'.

Minor cuesta :

- 10a Hetton-Chatton basin.
 10b Poorly drained Barmoor area.
 10c Ice-eroded crest and scarp.

Aln-Breamish watershed :

- 11a Glanton ridge.
 11b Splay-faulted, ice-eroded area.

through the massif, each of which possesses its own distinctive outlines. Furthermore, whilst glacial deposits, odd low terrace fragments and haughland are more pronounced downstream in each valley, variability of form and thickness precludes sweeping generalisations. The glacially overdeepened Milfield, Hedgeley and Chatton basins were later the site of glacial dumping, and in the former the Glen and Till streams now skirt the Milfield delta, produced when the basin was flooded to 200 ft o.d. Linking these basins is the Weetwood water gap—interpreted as being of meltwater origin—and to the south of the gap the Till and Breamish skirt another delta, formed beneath a 300 ft lake-level.³ The present River Aln shows a lower tract incised into drift deposits filling in part of the former valley, whilst the upper tract now appears misfitted and flowing in a valley enlarged by glacial erosion. Youthful streams on the eastern slopes of the major cuesta and on the coastal plain at present are controlled by depth and form of glacial deposits, form and alignment of glacially eroded features, besides the dip-slope itself. On Tweedside and north of the cuestas initial stream development in drumlin topography is seen, with the Tweed below Coldstream and the Till below Etal occupying post-glacial valleys.

Thus the development of the drainage pattern has depended upon the following factors:

- (a) The struggle between original stream alignments and geological structure.
- (b) The interruptions to development due to changes in base-level, together with preservation of higher residuals upon an igneous massif undergoing exhumation.
- (c) Additional changes induced by lithological variations.
- (d) Glacial interference.

On a regional basis the area can be subdivided into units which correspond to the igneous massif, the basins between the igneous massif and the major cuesta, the major cuesta and the coastal plain (Fig. 9 and table). Closer inspection of these units, however, suggests further subdivision into smaller but nevertheless distinctive parts. In the delimitation of all these physical units—whether on a regional, area or locality basis—attention has been paid to the factors of altitude and slope, lithology and structural relationships, state of dissection, type and thickness of overburden.

The author wishes to acknowledge the help and encouragement he received from Professor A. Holmes, Professor R. Miller, and the late Professor A. G. Ogilvie throughout this work. In addition, the grants received from the Carnegie Trust and the Moray Fund helped to defray the costs involved by the research. The Carnegie Trust has also assisted with the illustrations.

Copyright photographs: aerial view by courtesy of the Librarian, Messrs Aerofilms Ltd.; view of the Coldgate Valley, of Messrs Valentine and Sons Ltd.

¹ Only a solitary dyke of the Tertiary swarm crosses the area, and this, the Acklington dyke, is dated as being of late or post-Eocene age.

² In the delimitation of these surfaces, attention has been given to the slope factor, depth of overburden and relationships to associated features, e.g., valley benches.

³ It is further to be noted that parts, at least, of the Roddam and Lilburn valleys are of meltwater origin.

- ANDERSON, W. Possible Late Glacial Sea Levels at 190' and 140' o.d. in the British Isles. *Geological Magazine*, 1939, 76 : 50-52.
- BAILEY, E. B. The Interpretation of Scottish Scenery. *S.G.M.*, 1951, 50 (5) : 308-330.
- BURNETT, G. A., and others. The Geology of Belford, Holy Island and the Farne Islands. *Geological Survey Memoir*, 1927.
- BUTLER, G. Anniversary Address on Lake Ewart. *Proceedings of the Berwickshire Naturalists' Club*, 1907, 19 : 97-107.
- CARRUTHERS, R. G. On the Northern Glacial Drifts; Some Peculiarities and Their Significance. *Quarterly Journal of the Geological Society*, 1942, 98 : 241-253.
- and others. The Geology of the Cheviot Hills. *Geological Survey Memoir*, 1932.
- and others. The Geology of the Alnwick District. *Geological Survey Memoir*, 1930.
- CLOUGH, C. T., and MILLER, H. The Geology of the Country around Otterburn and Elsdon. *Geological Survey Memoir*, 1887.
- FOWLER, A. The Geology of Berwick on Tweed, Norham and Scremerston. *Geological Survey Memoir*, 1926.
- GREGORY, J. W. The Tweed Valley and its Relations to the Clyde and Solway. *S.G.M.*, 1915, 31 (9) : 478-485.
- HICKLING, and others. Contributions to the Geology of Northumberland and Durham. *Proceedings of the Geologists' Association*, 1931, 42 (1) : 217-296.
- JHINGRAN, A. G. The Cheviot Granite. *Quarterly Journal of the Geological Society*, 1942, 98 : 241-253.
- KENDAL, P. F., and MUFF, H. On the Evidence for Glacier-dammed Lakes in the Cheviot Hills. *Transactions of the Edinburgh Geological Society*, 1905, 8 : 226-230.
- LINTON, D. L. Problems of Scottish Scenery. *S.G.M.*, 1951, 67 (2) : 65-85.
- The Origin of the Tweed Drainage System. *S.G.M.*, 1933, 49 (3) : 162-175.
- On the Former Connection between the Clyde and the Tweed. *S.G.M.*, 1934, 50 (3) : 82-92.
- Ogilvie, A. G. Debatable Land in Scotland. *S.G.M.*, 1944, 60 (2) : 42-45.
- SMYTHE, J. A. The Glacial Geology of Northumberland. *Transactions of the Natural History Society of Northumberland and Durham*, 1912, 4 (1) : 86-116.
- TOMKIEFF, S. I. On the Weathering of Cheviot Granite under the Peat. *Proceedings of the University of Durham Philosophical Society*, 1928, 7 (4) : 233-243.
- WOOLACOTT, D. The Interglacial Problem and the Glacial and Post-glacial Sequence in Northumberland and Durham. *Geological Magazine*, 1921, 58 : 21-32 ; 68-69.

BEN NEVIS OBSERVATORY

In the early volumes of this *Magazine*, Ben Nevis Observatory was the subject of several notes. Among the members of the Royal Scottish Geographical Society interested in the observations on Ben Nevis was Dr W. S. Bruce, who was in charge of the Observatory in 1895-1896. In 1899, he ascended a peak in north West Spitsbergen, which was named Ben Nevis by Prince Albert of Monaco, to whom the Society's Gold Medal was presented in 1907.

The name of Mr R. T. Omond, the first Superintendent of the Observatory, was commemorated in the South Orkneys when Dr Bruce established a meteorological station at the head of Scotia Bay, Laurie Island : Omond House, which is represented on the reverse side of the Silver Medal of the Scottish National Antarctic Expedition. Work at Scotia Bay was continued by the Argentine meteorological service, which benefited by the closing of Ben Nevis Observatory on October 1st, 1904.

The Semicentennial of the closing is suitably remembered in the October issue of *Weather* in an editorial note and two very interesting articles, one, by Mr James Paton, on "Ben Nevis Observatory 1883-1904", and the other, by Professor C. T. Wilson, on "Ben Nevis Sixty Years Ago". "We in Scotland", writes Mr Paton, "take pride in the many achievements of our predecessors in the old Scottish Meteorological Society, and few of us can fail to experience deep regret that their Observatory on Ben Nevis remains as no more than a mouldering monument to their memory."—[Ed.]

GEOGRAPHY AT THE BRITISH ASSOCIATION

By OWEN HINCHLIFFE

AN environment more conducive than that of Oxford to the spontaneous advancement of science could not be found. Nor could any hospitality by either town or gown be excelled. It was the Vice-Chancellor, Sir Maurice Bowra, who raised the theme of the meeting: **THE UNITY OF KNOWLEDGE.**

Before the British Association was founded in 1831, men of religion had successfully enveloped the scientific findings of the two previous centuries in the fabric of their own belief. Divine providence knew no bounds. Then along came Darwin who upset the apple-cart. The dissension which followed found heated voice at the Oxford meeting of 1860, when T. H. Huxley said he would have had an ape for a progenitor rather than Bishop Wilberforce. At Oxford, 1954, this recollection caused joyous laughter. It was the Association's bad dream. Our evening orator, Professor C. A. Coulson, mathematician, natural philosopher and Methodist preacher, found in the apparent finality of science merely a creation of the human mind wherein science and religion could exist as a single concept which led one to the glory of God. Before the meeting ended, however, Professor C. D. Darlington prophesied the dissension of the future: between genetics and humanitarian medicine.

The President of the Association, Dr E. D. Adrian, contributed to the idea of unity by surveying the whole field of knowledge from atomic physics, through neuro-physiology, to the social sciences which he paternally accepted into the fold. Of geography, which has long synoptically viewed the natural and the social sciences, he said nothing. Nor did Professor Coulson seem aware that geography was striving towards that which he thought was most unlikely to happen in the early stages of the growth of modern science, to wit, "that we should any of us be big enough mentally to carry the same process which we accept within one discipline into the wider domain of the relation between the separate disciplines". If such single-mindedness be a thing of the future, at least one can find comfort in the fruitful symposia which were held at Oxford, such as the one on the physiological aspects of heating and ventilation to which a physiologist, a fuel expert and building engineer contributed, or the one on floods and coastal erosion where ideas were exchanged by a geographer, an engineer, a zoologist, a botanist and a geologist. The President of Section E, Professor J. A. Steers, stressed in his Address his firm belief "that there are many problems associated with the coast which can only be unravelled by co-operative effort".

The legend of the non-existent geographer was elaborated in the transactions of other sections. To one lecturer geography was something he hoped his audience had done at school, so that he could take them on to greater things: another afterwards explained that he had used the word 'geology', where he had so obviously meant 'geography', because it was the only hope of fixing a definite idea in people's minds.

It seems that geography has moved so fast this century that the public have been left standing. They may not have been waiting for our bus in any case. At the Brighton meeting in 1948, Lord Rennell of Rodd warned geographers that if they expected the public to sit up and take notice, they should first do something worthy of notice. To judge from this year's topics—coastal preservation, colonial food supplies, the siting of electricity stations, the German refugee problem, the age and sex structure in census areas, and weather and health—they seem to be trying hard enough. His Lordship had Africa in mind and, in this field, Section E has always been active through its Tropical Africa Research Committee. Mr R. W. Steel, its secretary, foresaw the completion of its work this year and the early publication of a report. He paid tribute to the late Professor A. G. Ogilvie, who was a founder-member and chairman of the committee.

One need not pander to public opinion or public taste. To be useful is one thing; to be popular is another. A misguided directive was sent to lecturers that they should make their pronouncements receptive to the general public. This was a dangerous and unnecessary step. Dr F. P. Bowden, using visual and practical aids, gave his evening audience a lucid idea of the very latest research in 'Friction' without visibly stooping. Others misconstrued the directive and stooped.

For Section E, Professor E. W. Gilbert and his staff elaborated the geography of Oxfordshire and ran several most successful excursions. Apart from the papers already mentioned and others, which demonstrated familiar methods in less familiar regions, there were several which presented interesting advances in method or technique. The device of W. V. Lewis (Cambridge) for measuring beach profiles, his tank experiments and their filming were especially remarkable. H. P. White (Gold Coast) was commended for being the first to make use of the data on the movement of food staples provided by the check points at the Volta ferries and for establishing his own check-points on the roads leading to Accra. Professor A. A. Miller (Reading) presented a simple method of mapping strip lynchets on a 2 ft contour interval. M. R. G. Conzen (Newcastle) suggested a method of morphological subdivision of small urban areas on the basis of growth, utilisation and building-type units of which the boundaries were superimposed. Study of the time element and the evolution of landscape patterns as suggested by Ogilvie (*Transactions, I. B. G.*, 1952) was furthered by J. W. House (Newcastle) who stressed the importance of the land-tenure pattern as well as of ecological patterns in the determination of type and rate of change in the rural landscape of the Central Massif; also by T. H. Elkins (King's College, London), who elaborated his thesis of the importance of social institutions in the development of the coalfield areas of South Yorkshire, Liège and the Ruhr.

It must be very evident that geography is as much concerned with man and his society as with his natural environment: as much with time as with space. We seek to understand relationships between man and his earth, relationships which progress with time and which are distributed in space. If non-geographers do not know what we are about, ought one to depend on the sectional transactions to advertise

their own content, or should one begin to wonder whether or not the title of our subject is at fault? Would a change of title, to one which defines more closely our modern content, damage rather than aid our chance of public recognition?

REVIEWS OF BOOKS

EUROPE

A Geography of Europe. By JEAN GOTTMANN. 9½×6½. Pp. x+699. Illustrated. New York: Henry Holt and Co. Inc., 1951. London: George G. Harrap and Co. Ltd. 30s.

Professor Gottmann's long but very general essay will satisfy the purpose for which it was written, namely, to give Americans an accurate description of Europe as far as data and length of the volume would permit. There is comparatively little to satisfy the European reader. The book, however, does offer a most valuable contribution in the political field, where the use of recent statistics of population and resources serves a useful purpose in reminding us of the great changes in the political and social structure of Europe which have taken place since 1939. Some of the photographs seem to have been chosen for their artistic merit rather than for their geographical content, but they are, on the whole, a useful addition to the text. Many of the maps convey little information which could not be gained from a good atlas. Considering the calibre of the author's other writing, the book, on the whole, is rather disappointing. K. W.

The Sea Coast. By J. A. STEERS. 8½×6. Pp. xii+276. 52 figs. 10 colour photographs. 24 photographs in black and white. [The New Naturalist, 25.] London: William Collins, Sons and Co. Ltd, 1953. 25s.

Professor Steers' new book continues his important writing on the coasts of Great Britain. It contains much that is new and unpublished, including especially the first systematic treatment of the Scottish coasts, and there is much reference to Scottish examples to illustrate general coastal features. Five of the coloured plates are from Scotland. After a general correlation of structure and coastline, the major processes of coastal formation and differentiation are considered, illustrated, and followed by cameos of coastal scenes of widely varied character. A particularly relevant and prescient chapter on vertical movements completes the treatment which is essentially exploratory and often justly tentative. At the same time the book is not easy to read, comparing unfavourably with others in this series. Its somewhat puzzling plan results in repetition. The excellent illustrations are poorly integrated with the text, so that valuable material is sometimes lost; it is especially trying to find important names missing from many of the maps. Perhaps a second edition may remedy these blemishes in an otherwise valuable book. C. A. H.

The Scottish Economy: A Statistical Account of Scottish Life by Members of the Staff of Glasgow University. Edited by A. K. CAIRNCROSS. 9×6. Pp. xvi+320. 17 figs. [Publications of the Department of Social and Economic Research, University of Glasgow. Social and Economic Studies, 2.] Cambridge: The University Press, 1954. 30s.

This book calls for the serious attention of all interested in the future of Scotland. In his introduction, Professor Cairncross sketches the essential Scottish scene: an industrial and urban economy, with three-fourths of the population in the Mid-Lowland, over half the total in the large towns, and over a third within twenty miles of the centre of Glasgow, the last an area with over half the factories; for the rest, except for Border woollens and Aberdeen, a scattered agricultural fringe.

A team of eleven economists and sociologists deals with particular aspects. A critical chapter by A. D. Campbell analyses national income; his estimate that

real income per head in Scotland is about 10 per cent lower than the U.K. average focuses the problem for which the book as a whole offers many clues. Scotland's relative weakness in the newer industries and in newer products within existing industries is frequently mentioned, and with it a backwardness in techniques and organisation of production. The major needs of more capital investment and industrial research to ensure adjustment to new world trends are emphasised. There are three chapters on population and man-power, and three in which educational, religious, and criminal habits are analysed. There are two cartograms, illustrating the chapter on health, but if this is all that could be done with maps we need not regret their absence from other chapters. C. J. R.

The Crofting Problem. By ADAM COLLIER. Foreword by A. K. Cairncross. 9x6. Pp. xv+191. 8 illustrations. 4 sketch maps. [Publications of the Department of Social and Economic Research, University of Glasgow. Social and Economic Studies, 1.] Cambridge: University Press, 1953. 25s.

Had this study appeared at the time of its preparation, it would have been an exceptionally valuable guide to those problems of the West Highlands, which have had so much attention during the past ten years or more, and which have been the source of pronouncements and expressions of opinion, official and unofficial, informed and, too frequently, otherwise. However, the sudden death of the author in 1945 caused publication to be delayed, and now the book has something of the nature of an historical document, rather than being a picture of things as they are.

Mr Collier has left a cool and competent appreciation of a subject which has generated as much emotional heat as any in present-day Scotland. As a concise description of the nature and origins of the crofting problem it is hard to equal. One has become so accustomed to the imaginative approach that the present account, with its insistence on hard facts and statistics, may seem somewhat colourless: there is, indeed, a tendency to neglect or insufficiently consider intangible factors such as sentiment and tradition which, however uneconomic, must not be overlooked in a consideration of motives in a peasant community. This is, nevertheless, a valuable and, on the whole, successful attempt to study the problem in its completeness, showing how the numerous aspects are related, and drawing attention to the fatuous consequences of piecemeal treatment by chronically unsuitable administrative machinery. A. MACP.

Torridon Highlands. By BRENDA G. MACROW. 8½x5½. Pp. xii+212. 25 illustrations. Sketch map. [The Regional Books.] London: Robert Hale Ltd, 1953. 18s.

In this volume of *The Regional Books* the author gives yet another picture of life in a Highland community as seen through the eyes of a sympathetic Southerner, and describes the districts in the vicinity of Loch Torridon with enthusiasm. The more rapturous descriptions of nature are sometimes embarrassing, but the human situation always seizes one's attention. The reproductions of Mr Adam's photographs, particularly those portraying the splendid architecture of the southern group of Torridonian peaks, greatly enhance the quality of the book. A. G. M.

North-East Lowlands of Scotland. By JOHN R. ALLAN. 8½x5½. Pp. x+262. 49 illustrations. Map. [The County Books.] London: Robert Hale Ltd, 1952. 18s.

A casual fingering of the pages of this well-produced volume brings to light some excellent and carefully chosen photographs; a closer study reveals that the word-pictures are just as vivid and contain a great deal of valuable information. The treatment of the area is somewhat unequal, since, although purporting to deal with the coastal counties from Kincardine to Caithness, the greater part of the book is concerned with the 'knuckle' of Scotland, the counties of Aberdeen and Banff. The exposition of land and life for these districts is extremely valuable, especially for the details of the agricultural development and the fishing industry. Yet the intimate, attractive and obviously knowledgeable account of other aspects of North-East life draws the reader through later chapters. The whole is a book to read for pleasure and keep for reference. K. W.

The Lowlands of Scotland: Glasgow and the North. By MAURICE LINDSAY. 8½ × 5½. Pp. xviii + 268. 49 illustrations. Map. [The County Books.] London: Robert Hale Ltd, 1953. 18s.

Mr Lindsay covers the area from the Firth of Clyde to Angus, passing through Stirling, Clackmannan, Kinross, and Fife. He writes from the historic and literary, rather than the geographic point of view. Though many readers will disagree with some of his findings, they will find him interesting if provocative. In the section on Fife, Mr Lindsay owes a debt to Mr Theo Lang's *Kingdom of Fife* [*S.G.M.*, 68 (1): 37], but he has also unearthed much interesting information of his own. The illustrations and some of the Scots verse quoted are among the most charming parts of this book, but the folding map is a poor one. I. W. H.

Ayrshire 1745-1950: A Social and Industrial History of the County. By JAMES EDWARD SHAW. Foreword by The Rt. Hon. Sir Charles MacAndrew, M.P. 9 × 5½. Pp. xiii + 279. 19 plates. [Compiled for the Ayrshire Archaeological and Natural History Society.] Edinburgh and London: Oliver and Boyd, 1953. 12s 6d.

In a comparatively limited space the author sets out to provide a social and industrial history of Ayrshire since 1745. Sensibly the story is broken down into sections and, where necessary, the help of specialists has been sought. To the geographer in particular, the sections dealing with Town and Country, Local Administration, Agriculture, Public Works, and also Social Life contain a wealth of selected information concisely presented. Other sections, which deal with the Church, Militia, Sport, Banking, and Biography, serve to complete the account.

The text is accompanied by various illustrations, but a good reference map of place-names is lacking. Through careful selection from the material available, the author has succeeded in presenting a book both readable and of general interest.

R. C.

West Durham: A Study of a Problem Area in North Eastern England. By G. H. J. DAYSH, J. S. SYMONDS, and others. 10 × 6. Pp. x + 198. 3 figs. 7 illustrations. 8 maps. Oxford: Basil Blackwell, 1953. 45s.

This book is concerned with an area where the reserves of high-quality coal are rapidly dwindling and the alternatives to coalmining are either few, as in NW Durham, or reflect Development Area policy, as in SW Durham. In the authors' words, "It is the fundamental problem of how far there should be intervention in the natural process of economic growth and decay which has interested us, and all the contents of this Report have been intended to bear on this problem." Using abundant material collected in W Durham, also in the whole of the NE Region, the authors have presented comprehensive analyses set against the regional background.

Following a brief preamble and geographical introduction to the area, the first part of this work hammers home the lessons of over-reliance upon a few basic industries founded on a wasting asset. In the second part, the reader is provided with a most attractive section on settlements and with a chapter on travel to and from work. In the third part, the notion of Development Areas and the need for them is first outlined, then the results of Development policy are illustrated in SW Durham. An appraisal of possible solutions to the future needs of NW Durham follows logically. Quite rightly the authors have refrained from expanding parts of the appraisal, for their aim has been to present a fact-finding report and not a plan. Since many of the problems of W Durham are shared by other parts of the British coalfields, the scope, method, and results of the enquiry are of more than merely regional interest.

R. C.

Sandy Shores in South Lancashire: The Geomorphology of South-West Lancashire. By R. KAY GRESSWELL. 8½ × 5½. Pp. xii + 194. 46 figs. 31 illustrations. 23 tables. [Liverpool Studies in Geography.] Liverpool: The University Press of Liverpool, 1953. 30s.

Mr Gresswell's treatment of a complex subject is a happy combination of general and particular. It contains abundant factual material but is nowhere tedious. A

discussion of strand-line movements and their effects on the S. Lancashire coast is followed by an explanatory description of drainage on the low ground, and this in turn by an account of the existing shore. The examinations of dunes and of fells is particularly valuable; the author makes out a case for the origin of fells in the combined effects of destructive and constructive waves. Among the interesting conclusions are: that emergence can cause aggradation of river profiles, that the 25-ft beach is older than the (local) submerged forests, that a narrowing of the backshore precedes a change from accretion to erosion, and that cartographers of the sixteenth and seventeenth centuries took the landward edge of dunes as the coastline.

So comprehensive and far-ranging a work is bound to occasion some small differences of opinion which, however, do not detract from the value of a truly geographical account. The general conclusions are briefly, clearly, and very modestly put. The book is elegantly produced.

G. H. D.

A Scientific Survey of Merseyside. Edited by WILFRED SMITH. $9\frac{1}{2} \times 7\frac{1}{2}$. Pp. xv+299. 62 figs. 16 plates. 2 folding maps. [Published for the British Association.] Liverpool: The University Press of Liverpool, 1953. 21s.

This survey was prepared for the 1953 meeting in Liverpool of the British Association, and follows the pattern and maintains the high standard of the annual regional surveys of recent years. To select for detailed comment any one chapter from nearly thirty contributors would be invidious: we may congratulate Professor Smith of the Liverpool Geography School on an excellent piece of work. The printing of the volume by The University Press of Liverpool also demands a word of commendation.

H. F.

Green Gold and Granite: A Background to Finland. By WENDY HALL. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 190. 12 illustrations. Sketch map. London: Max Parrish and Co. Ltd, 1953. 17s 6d.

No one who is interested in the survival of a numerically small nation can fail to be enlightened and fascinated by Miss Hall's appreciation of the character of the Finns. Her book deals with the land and the people, with cultural and other achievements, and with the history and present-day economic and political problems. Her perceptivity and vivid presentation of the general background to Finland have resulted in a volume pleasurable to read and unobtrusively informative, though deserving a far better map than that provided. There is a useful list of recent books giving more detailed information on specific aspects of Finland.

J. H. K.

Germany: A General and Regional Geography. By ROBERT E. DICKINSON. 9×6 . Pp. xxiv+700. 121 figs. 32 illustrations. [Advanced Geographies.] London: Methuen and Co. Ltd, 1953. 50s.

The publishers describe this book as seeking to impart something of the distinctive aim and method of German scholarship. This has undoubtedly been achieved, although perhaps to a degree slightly greater than the author intended: the book itself gives an air of being German in conception, and partaking not only of the excellencies of the German approach, but also in a few instances of the defects. Professor Dickinson's study is ingeniously conceived, highly detailed, and embodies a wealth of personal scholarship. His bibliography alone is an important contribution to knowledge of German geographical writing; and he carries analysis of Germany further than any other writer in English. He is also careful to give native authority alongside his own, which is itself considerable; his statistics are carefully chosen, up to date, and highly relevant; his illustrations are profuse and valuable, and well presented.

Yet despite all these merits, which make the book an indispensable part of modern geographical literature in English, there is one drawback. Many German words—maybe too many—occur in the text, but one is absent: *Zusammenhang*. Because of the author's tendency to categorisation, the emergent impression is one of a discontinuous array of regions, lands, resources, and responses. Style is moreover not altogether happy, since besides a tendency to repetition, and an occasional ponderous return to first principles, a didactic air and undistinguished syntax do not make for easy reading. Reproduction of the terrain maps (figs. 108 to 121) is disappointing.

W. B. F.

Paris. By ANDRÉ GEORGE. 9×6½. Pp. 239. Heliogravures. [Les Beaux Pays.] London: Nicholas Kaye Ltd, 1952. 21s.

Like the volume on *London* [*S.G.M.*, 69 (1): 34] in this series, the present book is characterised by an abundance of superb illustrations and a readable text. The anticipative or nostalgic visitor, the teacher who wishes to transmit the idea of a focus of European civilisation, and also the arm-chair traveller will desire to possess a copy, even though a plan of Paris, unfortunately, is not included. I. E. C.

Another Spain. By CHURTON FAIRMAN. 8½×5½. Pp. 202. 49 plates. London: Museum Press Ltd, 1952. 18s.

This is a travel diary written by the author and his Spanish wife. It is a vivid narrative, influenced by the delightful Spanish trait of modest exaggeration. The book is empirical in its description but creates successfully the atmosphere sensed by an observant foreigner in Spain, who is helped to get beneath the skin of the casual observations so characteristic of the hotel-bound tourist. Of all the landscapes which the author describes, he is most successful in capturing the atmosphere of northern Castile. The text is illustrated with excellent photographs by the author. J. M. H.

ASIA

Secret Tibet. By FOSCO MARAINI. Translated from the Italian by Eric Mosbacher. Introduction by Bernard Berenson. 9½×6½. Pp. 251. Frontispiece. 60 plates. Sketch map. London: Hutchinson and Co. Ltd, 1952. 30s.

While not lacking the graphic description of the travel book, this very well illustrated volume is primarily the work of a student of Tibetan philosophy, religion, and art. Through a study of these, the author has attempted to resolve the paradox of the "sinister Tibetan imagination" against the light and space of its mountain background. In so doing, he clearly reveals the nature of any mountain land, where are to be found the opposing factors of penetration and isolation, the former allowing the entry of alien influences, the latter allowing them to become so well established as to appear innate. N. McL.

Seven Years in Tibet. By HEINRICH HARRER. Translated from the German by Richard Graves. Introduction by Peter Fleming. 8½×5½. Pp. xv+288. Frontispiece. 25 illustrations. Sketch map. London: Rupert Hart-Davis Ltd, 1953. 16s.

To those who attended the author's lecture to the Royal Scottish Geographical Society some of the features of this narrative are already known. Thrown by circumstances on the resources of Tibet, the author experienced its contrasting nomadic and sedentary ways of life, which he describes with clarity. During his travels he spent much time both with pastoral and trading nomads, while his forced stops at towns en route to Lhasa and his intimate experience of life in that city acquainted him with the life of Tibetan town-dwellers. This is a book of outstanding interest both for the student and the general reader. N. McL.

AFRICA

Ethiopia and Eritrea: The Last Phase of the Reunion Struggle, 1941-1952. By E. SYLVIA PANKHURST and RICHARD K. P. PANKHURST, B.Sc.(ECON.), PH.D. Foreword by Lady Pethick-Lawrence of Peaslake. 8½×5½. Pp. 360. 4 figs. Frontispiece. 52 plates. Woodford Green: Lalibela House, 1953. 18s.

To Eritreans and to the inhabitants of the neighbouring kingdom of Ethiopia, liberation, in 1941, from the hated Italian yoke heralded Eritrean independence and an opportunity of closer association with Ethiopia. It took ten years to resolve the resulting conflict between wartime necessity and fervent patriotism; the solution recommended by the United Nations was a Federal Constitution for Eritrea, which, while giving local autonomy to Eritrea, reserved to Ethiopia control of defence, diplomacy and overseas commerce. The history of these ten years is presented here with careful and full documentation. K. M. MacI.

Kalahari Sand. By FRANK DEBENHAM, O.B.E., M.A., D.Sc. 8½×5½. Pp. 189. 16 photographs. Sketches. 5 sketch maps. London: G. Bell and Sons Ltd, 1953. 15s.

During recent years the author has visited East and South-East Africa in the course of investigations into the problems of water resources. In *Kalahari Sand*, which deals with two expeditions to Bechuanaland, amusing anecdotes and charming illustrations combine to convey Professor Debenham's own vivid impressions of this little-known region. He is a practical geographer and much of his material was gathered by careful survey, often under great difficulties, which, characteristically, he presents as amusing rather than as exasperating or even heartbreaking episodes. In discussing methods of survey, details are given of various traverses and original sketch-maps reproduced from field note-books. Conclusions are restricted to an analysis of the problems of water supply and control which, in turn, leads to a discussion of the balanced development of the area, a development which must be based not only on the physical resources but also on the particular needs of the Bushmer.

K. M. MACI.

AMERICA

Southampton Island. By J. BRIAN BIRD. 9½×6½. Pp. viii+84. 19 figs. 8 plates. [Department of Mines and Technical Surveys, Geographical Branch Memoir 1.] Ottawa: Queen's Printer and Controller of Stationery, 1953. \$0.50.

Comparable in size to Switzerland, Southampton Island lies south of the Arctic Circle but is arctic in character. Within a short distance of each other on the island are uplands of Precambrian crystalline rocks—part of the Canadian Shield—and Palaeozoic limestone lowlands—physiographically part of the Hudson Bay Lowlands. The marshes of the limestone lowlands form extensive summer breeding grounds for water birds. Of considerable interest, too, is the location of former and present-day human settlements: the Sadlermiut Eskimo, whose culture was related to that of the Thule culture peoples, survived here until 1902.

Observations made in 1950 by a field party of the Geographical Branch, and findings by other observers, are summarised in this well-produced memoir, which deals with the exploration, systematic and regional geography, and human geography of the island. In addition to the value of its scientific content and bearings, the study has practical implications, e.g., for the planning and establishment of communications and settlements.

J. H. K.

The Florida of the Inca. By GARCILASO DE LA VEGA. Translated and edited by JOHN GRIER VARNER and JEANNETTE JOHNSON VARNER. 9½×6. Pp. xlviii+656. Drawings and decorative end-paper map, by Reese Brandt. Edinburgh: Thomas Nelson and Sons Ltd, 1951. 30s.

The splendour and the tragedy of the expedition (1538-1543) of Hernando de Soto, who hoped to discover mines of gold and silver in that Florida wherein Ponce de León had sought the Fountain of Youth, have challenged the skill of modern historians so sharply differentiated in outlook and in technique as Francis Parkman and R. B. Cunningham Graham. Their predecessor of the sixteenth century, Garcilaso de la Vega, son of a Spanish hidalgo and an Inca princess, had the good fortune to base his narrative on the tales he heard from one of De Soto's captains, corroborated by the recorded testimony of two other soldiers who had shared the dangers and the disasters that overtook the expedition.

So intense was the sympathy of Garcilaso for the Spanish pioneers, so skilled his pen, that many of the incidents of his moving tale have a strange power to rivet the attention of the reader of to-day. This very able translation, the first to be made into English from the Spanish, conveys with scholarly care and sympathetic insight the ease, grace, clarity and vigour of the history composed by the far-travelled soldier-cleric in his book-lined study in the Moorish city of Cordova. It is highly appropriate that this translation should be the work of two scholars of Texas, a region whose forests, four hundred years ago, looked down on the fateful march of the Spanish column.

G. P. I.

GEODESY

Geodesy. By Brigadier G. BOMFORD, O.B.E., M.A., D.Sc., F.R.I.C.S. 9½ × 6. Pp. xiv + 452. 165 figs. Oxford: Clarendon Press, 1952. 50s.

The late Mr John Mathieson provided a brief account of the history and scope of geodesy [*S.G.M.*, 1925, 42 (6): 328-347, 15 figs.]. Brigadier Bomford's book is the first extensive exposition of geodetic practice and theory published in Great Britain since A. R. Clarke's *Geodesy* of 1880. It therefore fulfils a long outstanding need, for during the intervening period there have been great advances both in field methods and instruments and in the body of geodetic knowledge thus acquired. The principles and methods of modern geodetic surveying are given in sufficient detail, so that the book constitutes a most valuable volume of reference for the practical geodetic surveyor. It also gives a full account of the mathematical basis of geodesy, and describes the more recent developments in geodetic surveying.

Another valuable aspect of the book is that information on some of the subjects dealt with was hitherto only available in publications not readily accessible. Some 330 references are included in the bibliography. A fair knowledge of ordinary surveying and survey instruments by the reader is assumed, and for a full understanding of the mathematical arguments a knowledge of higher mathematics is essential. The text is well illustrated by diagrams which are simple and easy to follow. The standard of production of the book is excellent. J. S. O. J.

CARTOGRAPHY

Decorative Printed Maps of the 15th to 18th Centuries. A revised edition of 'Old Decorative Maps and Charts', by A. L. Humphreys. By R. A. SKELTON, F.S.A. 12½ × 10. Pp. vii + 80. 84 plates, including 12 in colour. London: Staples Press Ltd, 1952. 73s 6d.

Maps and Their Makers: An Introduction to the History of Cartography. By G. R. CRONE, M.A. 7½ × 4½. Pp. 181. 7 figs. London: Hutchinson's University Library, 1953. 8s 6d.

The Superintendent of the Map Room in the British Museum has improved on the earlier publication by Humphreys which was intended to excite the curiosity of collectors. Twenty-two new plates have been added and a new text, which will make a strong appeal to scholars as well as collectors. It is still essentially a specimen-book of maps, both plain and coloured. Of these, there are eight groups arranged historically, for each of which there are a few pages of general comment and a good bibliography. An introduction deals with the analysis of maps as works of art.

The Map Curator of the Royal Geographical Society has attempted to cover within the limits of too small a volume the evolution over the last 5000 years of our idea of the world as expressed in maps. Mention of the many and description of a few make the pages rich to overflowing. Each chapter has an excellent bibliography, and though there are few illustrations, a list of published reproductions is appended. Paths of controversy are not avoided, and one feels the strong guiding hand of the master.

These two books are a good couple to whet the appetite of the beginner, to teach everyone something, and to adjust the form and perspective of historical cartography. O. H.

The Look of Maps: An Examination of Cartographic Design. By ARTHUR H. ROBINSON. 9½ × 6. Pp. x + 105. 3 figs. Madison: University of Wisconsin Press, 1952. \$2.75.

In a series of essays Professor Robinson makes a critical analysis of the elements of cartographic technique. Although revolutionary strides have been made in some technical aspects, he emphasises the need for a more scientific approach to lettering, colour and design in order to achieve effective visual presentation. He challenges the traditional conservatism of cartographers, backed as it is by the map-using public. While he acknowledges the international approval for the representation of contour-layers by tints "somewhat according to the spectrum", he states that the only justification for this convention is its conventionalism.

In this and other ways he belittles the value of acquired artistic judgement in achieving visual balance and effect; and he tends to introduce needless complexities by an over-emphasis of the analytic approach.

Essentially, this is a helpful book which makes a creditable and timely effort to stimulate the needed research into improved cartographic method. J. C. B.

GEOMORPHOLOGY

Morphological Analysis of Land Forms: A Contribution to Physical Geology. By WALTHER PENCK. Translated by Hella Czech, PH.D., and Katharine Cumming Boswell, B.A., M.Sc. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. xiv+429. 21 figs. 12 plates. London: Macmillan and Co. Ltd, 1953. 42s.

In the thirty-one years since the posthumous publication in Berlin of this portion of an uncompleted geological text-book, controversy has waxed and then waned over its contents. English-speaking physical geographers believed Penck to have challenged both the basis and conclusions of W. M. Davis in his development of the idea of the cycle of erosion. But even at the outset, De Martonne saw the challenge was rather one of precision than fundamental. This excellent translation allows us to disentangle essentials from infelicities of composition; although exact in content, the English version seems easier to follow than most Germans had found the original.

It is doubly sad that Miss Boswell herself was overcome by those same desert conditions which inspired Penck; her masterly sixty-two page précis shows we have lost the clearest thinker this subject has enjoyed. The dogmatic statements attributed to Penck by his opponents become in her capable hands part of a reasoned and stimulating thesis: since slopes must develop continuously by weathering, Davisian peneplains are rare end-phases of erosion; polycyclic landforms which are normally reflections of base-level changes may sometimes be the result of a single developmental sequence and thus require careful broad appraisal. The incentive to observe on such terms is a debt present and future workers owe to Penck. C. A. H.

CLIMATOLOGY

Climatology. By A. AUSTIN MILLER, D.Sc. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. x+318. 82 figs. [Advanced Geographies.] London: Methuen and Co. Ltd. New York: E. P. Dutton and Co. Inc. Eighth edition, 1953. 21s.

The main features of the original edition of 1931 [*S.G.M.*, 48 (1): 55-56] are preserved in the latest edition of this well-known book. Many readers will regret that when the author introduced the chapter on air masses in the third edition (1944), he did not take the opportunity of revising his system of classification. As it is, this chapter appears out of place and unnecessary, since the ideas with which it is concerned, fundamental and important though they are in matters climatological as well as meteorological, are scarcely used in subsequent chapters. But it is perhaps churlish to cavil at the content of a book that has reached its eighth edition, is clearly and attractively written and contains many excellent text-figures. J. P.

BIOGEOGRAPHY

The Story of the Oceans. By JOHN SCOTT DOUGLAS. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 272. 15 plates. London: Frederick Muller Ltd, 1953. 15s.

The bulk of this engaging volume is devoted to plants and animals of the ocean, not without due reference to their exploitation by man. The initial chapters, which could be amplified and revised to advantage, deal with the ocean itself and its exploration. It is to be hoped, by the way, that in a future edition the spellings Pelée, Pribylov, Spitsbergen will be used, instead of Pelé, Pribilof, Spitzbergen. Though packed with interesting information, the book is by no means stodgy, and provides palatable fare for the general reader. Even though lacking a guide to further reading, it will also usefully stimulate the budding student of oceanography and biogeography. J. H. K.

Zoogeography of the Sea. By SVEN EKMAN. Translated from the Swedish by Elizabeth Palmer, Ph.D. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. xiv+417. 121 figs. 598 references. [Text-Books of Animal Biology.] London: Sidgwick and Jackson Ltd, 1953. 42s.

This vast subject has been ably treated by an authority whose original work in Swedish now runs to a second revised edition. Many of the involved problems cannot yet be solved for want of factual information: thus, bipolarity and the Wegener theory are discussed but not solved. The bibliography is not quite complete and many of the data acquired during the early years of this century, which were so fruitful a period, are apparently ignored.

It is a most valuable work, however, and is adequately illustrated with sketch maps and other text-figures. R. N. R. B.

The Geography of the Flowering Plants. By RONALD GOOD, M.A., SC.D. 10×6 . Pp. xiv+452. 75 figs. 25 plates. London: Longmans, Green and Co. Ltd. Second edition, 1953. 50s.

In the original edition of Professor Good's work [*S.G.M.*, 64 (2); 107], knowledge of the distribution of the angiosperms was presented as it was in 1939. The amount of information accumulated since then is reflected by the increase in bibliographical references, from 295 in the first edition to 629 in the second. Not only have additional data been incorporated in the text, but some parts have been entirely rewritten, and several illustrations have been modified. Specific names derived from human, vernacular, or generic names are no longer spelled with a capital letter, thus conforming with zoological practice.

As the number of species of flowering plants is now estimated to approximate a quarter of a million, Professor Good is to be congratulated on his skilful presentation of the essentials of distribution. Some conclusions may be debatable, and the book was written for botanists, but it is very useful in geographical libraries.

J. H. K.

Plant Life in the Scottish Highlands: Ecology and Adaptation to their Insect Visitors. By ALEXANDER EDWARD HOLDEN. $8\frac{1}{2} \times 6\frac{1}{2}$. Pp. xv+319. 64 photographs by Robert M. Adam. Edinburgh: Oliver and Boyd Ltd, 1952. 30s.

This delightful book on the wild flowers of the Highlands is written for the amateur botanist rather than the specialist, and fills a definite gap in such literature. It describes the flowers from the ecologic viewpoint—meadow, moor, loch-side, mountain summits, and so on—giving in detail descriptions of their adaptations to these various environments. The author escapes being too technical for the ordinary plant-lover but at the same time gives him much scientific information. Mr Adam's magnificent photographs are a worthy embellishment to the author's fine word-pictures.

I. W. H.

POLITICAL GEOGRAPHY

La Politique des États et leur Géographie. By JEAN GOTTMANN. $9 \times 5\frac{1}{2}$. Pp. xi+228. [Collection 'Sciences politiques.'] Paris: Librairie Armand Colin, 1952. fr. 670.

Professor Gottmann has written an unillustrated essay on political geography. This new assessment attracts and stimulates because its pattern and spirit spring from a single-minded concept of the whole purpose of geography—which is the bridging of the gap between the natural and human sciences.

The fluid mass of international relations is observed against the stable distributions of the earth's surface. The major features are examined in turn to show how they may pose political questions. The nature of frontiers is discussed: the 'dynamic' concept is dismissed. When can a nation be called 'rich' or 'poor', 'strong' or 'weak'? An analysis of brute numbers is not sufficient to establish the military strength of a state or whether it is overpopulated. The answers lie in the field of economics, sociology and psychology. Finally, the evolution and influence of 'regionalism' is discussed. We are told where the answers lie; the question of method and criteria remains untouched.

O. H.

BIOGRAPHY

The Coast of Incense: Autobiography 1933-1939. By FREYA STARK. 8½×5½. Pp. xiii+287. 51 illustrations. Sketch map by H. W. Hawes. Wood engravings by Reynolds Stone. London: John Murray Ltd, 1953. 25s.

Very many people will have read with appreciation the volumes of Miss Stark's autobiography which have already appeared, *Traveller's Prelude* and *Beyond Euphrates* [see *S.G.M.*, 67 (1): 62, and 68 (1): 44]. The third of the series speaks, largely through letters, of the period before the war, when the shadows were darkening in Britain, Italy, and the Middle East. Yet the emphasis of the book is not on international affairs. The author's dominant interest is travel: the East is reflected throughout. The first part is mainly concerned with the expedition to the southern gates of Arabia, the "Coast of Incense". A sojourn in Iraq was followed by further exploration with Miss Caton Thompson and Miss Gardiner, again in Southern Arabia. But wherever Miss Stark goes, whether amongst her numerous friends in Britain, to her mother's home in Northern Italy, or to the desert peoples who have such a fascination for her, she describes so intimately and with such candour that we share her experiences in a way which is quite unique. This volume is not to be appraised and dissected as a travel book; it is a gift from a great writer and an intrepid student of the East; instead, we offer our thanks.

H. F.

Arabian Adventurer: The Story of Haji Williamson. By STANTON HOPE (W. E. Stanton-Hope, F.R.G.S.). Foreword by A. H. T. Chisholm, C.B.E. 8½×5½. Pp. 335. 23 illustrations. London: Robert Hale Ltd, 1951. 16s.

This is the story of W. R. Williamson, a Bristol man born in 1872, who before he was twenty had travelled and worked in California, sailed in the Arctic Ocean, and traded in the Pacific. Finally he adopted the Moslem faith and, after living in various parts of Arabia, finally settled in Basra. A colourful career has made his name something of a legend in lands bordering the Persian Gulf.

The author has written Williamson's story in an attractive and easy style. Two general points will commend this book: firstly, it is an account of personal initiative and endurance rarely experienced nowadays by many of us under prevailing conditions in this country; secondly, we leave the broad highways travelled of necessity by orthodox geographical texts, and explore unsuspected facets of the Middle East, with a consequent re-estimation of our own standards and ways of life.

I. R. F.

Francis Younghusband: Explorer and Mystic. By GEORGE SEAVER, LITT.D. 8½×5½. Pp. xi+391. 13 illustrations. 4 sketch maps by Charmian Longstaff. London: John Murray Ltd, 1952. 25s.

For twenty-eight years Sir Francis Younghusband served the Government of India, as cavalry officer in the Punjab, as political officer on the North West Frontier, as political agent in Rajputana, as leader of the 1903 Mission to Tibet, and finally from 1906 to 1909 as Resident in Kashmir. While his biographer gives due emphasis to the subsequent thirty-two years of active retirement which Sir Francis enjoyed, and traces carefully the development of the philosophy of religions to which his attention was increasingly devoted in these years, the bulk of this book is concerned with his travels and work in Asia. It includes many valuable sidelights on the relations between the Indian Empire and neighbouring peoples which are particularly interesting in the light of current political developments.

A. A. M. H.

[Sir Francis Younghusband was awarded the Royal Scottish Geographical Society's Gold Medal in 1905. In 1940, according to a passage in Miss Hilda Martindale's *Some Victorian Portraits* cited by Dr Seaver, Sir Francis "gathered together all his gold medals and decorations and insisted on taking them to the Exchequer to have them melted down." "The medals in question," Dr Seaver mentions, "were from four Geographical Societies: The Royal; the Royal Netherlands; the Royal Scottish; and the American . . ."—ED.]

EDUCATIONAL

The Skin of the Earth. By A. AUSTIN MILLER, D.Sc. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. ix+198. 67 figs. [Advanced Geographies.] London: Methuen and Co. Ltd, 1953. 21s.

Although primarily a manual of practical physical geography, this book deserves a much wider audience than the subject might suggest. It provides a first-rate lesson for those who find—or fear—that physical geography is but a formless agglomeration of titbits of other sciences, and that geography in the laboratory is but the mechanical compilation of exercises, yielding little stimulus to further thought. Many of the methods and exercises are well-tried friends; others, less familiar, have been developed by Professor Miller at Reading University. In general, all aim at analysis—statistical, cartographic or diagrammatic—of the basic data of physical geography. Throughout, the emphasis is on distributions and their relationships—apparent or real.

Here, then, is the essential nature of the science of geography, illustrated practically, most usefully, and—as one would only expect of the author—in a most stimulating and entirely readable manner. H. A. M.

Teach Yourself Archaeology. By S. GRAHAM BRADE-BIRKS. $7 \times 4\frac{1}{2}$. Pp. xii+220. Frontispiece. 120 figs. [The Teach Yourself Books.] London: The English Universities Press, Ltd, 1953. 6s.

An incredibly large amount of information has been compressed into this volume of *The Teach Yourself Books*. It is concerned not merely with archaeology as usually defined but with things of the past in general, including a brief history of architecture and an introduction to heraldry. The scope is restricted, however, by a preoccupation almost entirely with Britain and, indeed, with England. The mass of detail could be criticised by the specialist time and again for its shortcomings, but the purpose of the volume in the series must be the primary concern of the reviewer. It seems very doubtful whether the beginner would in fact acquire any more than a very superficial idea of the sort of facts in which the modern antiquary is interested. Short cuts to knowledge are always suspect. Illustrations are plentiful, but there is only one map; this attempts to show the soil types of England and Wales, and even a full chapter of explanation leaves the uninitiated somewhat mystified. Yet one cannot help but admire a writer with such a variety of information at his disposal, and the courage and enthusiasm to attempt so wide a survey. H. F.

Colliery Surveying. By R. McADAM. $8\frac{1}{2} \times 5$. Pp. vii+146. 81 figs. Edinburgh and London: Oliver and Boyd Ltd, 1953. 12s 6d.

Professor McAdam's straightforward, clearly written text-book, with its review questions and worked examples, is intended for candidates for Colliery Managers' and Under-managers' Certificates of Competency and for the National Certificate in Mine Surveying. The chapters cover chain and compass surveying, levelling, areas and volumes, dip and fault problems, and theodolite surveying. The book may also find a place in the library of departments of geography. J. H. K.

GENERAL

Geography in the Twentieth Century: A Study of Growth, Fields, Techniques, Aims and Trends. Edited by GRIFFITH TAYLOR. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. xii+661. 57 figs. 15 plates. New York: Philosophical Library Inc. London: Methuen and Co. Ltd. Second edition, 1953. 35s.

To mention some of the twenty-two authors—Stamp, Wooldridge, Bowman, Huntington—is to indicate the excellence of the material. Individual authors have been allowed to express their views freely, so there is no unity in the work other than that of commonly indicating what geographers have done in the last half-century. Chapters have been allotted to the French and German Schools of Geography; British Geography is apparently thriving on diversity.

The first part discusses the growth and philosophical basis of geography. In the second, various aspects of the natural environment are treated, followed by surveys of work on especially attractive regions—polar, pioneer and tropical. Gilbert makes a useful contribution on regionalism, and Stamp on land use survey. The third part covers human aspects—political, racial, sociological and urban geography. Finally, there are important chapters on The Field of the Geographical Society and on Geography in Federal Government. O. H.

Le Razze e i Popoli della Terra. By RENATO BIASUTTI. 10 $\frac{1}{2}$ x 7 $\frac{1}{2}$. Vol. I. *Razze, Popoli e Culture.* Collaborators: M. Bartoli, R. Battaglia, R. Corso, G. Genna, P. Graziosi, S. Sergi, C. Tagliavani, G. Vidossi. Pp. xii+723. Frontispiece. 495 figs. 16 colour plates. Vol. II. *Europa-Asia.* Collaborators: R. Corso, R. Battaglia, M. Muccioli. Pp. 656. 565 figs. 6 colour plates. Torino: Unione Tipografico-Editrice Torinese. Vol. I. Second edition, 1953. L 7200. Vol. II. Second edition, 1954. L 6500.

Professor Biasutti's treatise, which first appeared in three volumes in 1940, was the first wholly Italian work of this dimension. Much additional material has been incorporated in this second, four-volume edition. Although anthropology and ethnology are treated in separate chapters, Professor Biasutti shows that nowadays a strict separation of the two disciplines is unnecessary and undesirable.

Due consideration is paid to recent research on serological differentiation of 'race'. R. Battaglia discusses racial variation in puberty and growth and in psychosomatic characteristics. Biasutti surveys the morphological traits, and continues with an original classification of *Homo sapiens* into four branches, sixteen principal races, and fifty-three secondary races. In the manner of Ratzel, who distinguished a northern and a southern major group, he has two historical and spatial cycles which he calls 'equatorial' and 'boreal'. There follow two chapters on linguistics and the classification of language. Thereafter, the first volume deals methodically with individual cultural traits and, in conclusion, Biasutti surveys the classification of cultures.

In the second volume is presented a regional study of the races of Europe and Asia and of their associated ethnography. Biasutti has written most of this volume, except for the hand of R. Battaglia on E and SE Europe, of R. Corso on the ethnography of Italy, and of M. Muccioli on the Far East. The two volumes to follow will cover the rest of the world.

The editor has given these volumes an extraordinary coherency. Throughout, he has insisted on uniformity and balance of a clear and methodical presentation. Throughout, data are systematically and carefully mapped and are amply illustrated. These volumes are very much a personal triumph for Professor Biasutti. They will stand as a comprehensive survey of the state of anthropology and ethnology in the middle of this century. O. H.

American Geography: Inventory and Prospect. Edited by PRESTON E. JAMES and CLARENCE F. JONES. 9 x 6. Pp. xii+590. 33 figs. [Published for the Association of American Geographers.] Syracuse, N.Y.: Syracuse University Press, 1954. \$6.

The Association of American Geographers has reached its fiftieth year, and to mark the occasion this book has been written as a joint contribution by many of the outstanding members. It reviews past achievements and considers trends and research at the present time. For every chapter, an original draft has been discussed and amended by several individuals each with special interest and competence in the field under survey. The book as a whole must therefore be regarded as an authentic statement of what Geography means to Americans. A team of critics would suitably assess in detail the significance of this inventory.

The first chapters on the Field of Geography, the Regional Concept and Historical Geography, provide a critique for the subject as a whole, with a candid interpretation of the American contribution. Understandably and naturally, American works and the geography of the United States bulk largely in it. Above all, the essential unity of the subject is strongly emphasised. It seems a little unfortunate that in some of the chapters which follow, discussing Geography topic by topic, the need to differentiate the subject matter has somewhat concentrated attention on the sub-divisions. Some of the later chapters, too, have not risen above the temptation to catalogue rather than assess, even to recapitulate elementary principles. Variety is, of course, inevitable in co-operative writing of this type.

The book as a whole leaves no doubt of the intense enthusiasm and activity in America to-day, but the outside observer, one suspects, might well wonder whether the trunk of a vigorous tree has developed sufficiently to carry the branches whose length and ramifications have been so carefully emphasised. Perhaps the explanation is to be found in the concentration upon topics, the systematic approach; the

regional monographs have been subordinated to the regional concept. It would be ungracious, however, to end on a note of criticism, and we can in all sincerity thank our American colleagues for a most stimulating discussion of the subject and themselves. H. F.

Our World from the Air: An International Survey of Man and his Environment. By E. A. GUTKIND. Foreword by G. P. Gooch, C.H. Introduction by Professor E. G. R. Taylor. 11½×10½. Pp. 256. 400 photographs. London: Chatto and Windus, 1952. 63s.

This book is a collection of air photographs, arranged not to form a systematic geography of the world, as the title might suggest, but to give a survey of the ways in which Man has adapted his environment to his needs, according to the stage of his development. The photographs are well chosen, with brief captions giving essential information. A short discussion of Man's adjustment to, and modification of his environment precedes the collection, which is divided into sections illustrating the stages in this process. Each section is prefaced by a few sentences and key words indicating its main trends. The value of the illustrations to geographers cannot be doubted. J. M. S.

The Geography of Towns. By ARTHUR E. SMAILES. 7½×4½. Pp. 166. 22 figs. London: Hutchinson's University Library 1953. 8s 6d.

Both the concept and reality of towns are dealt with in this book. The first two chapters give an account of the origins and bases of urban settlements, while the third cites examples of the variety of town sites and situations. Some aspects of urban civilisation are next treated briefly. The last three chapters are concerned with the functional patterns of towns, both internal and external, and their structure. Although the headings of the chapters are in broad terms, their contents, usually based on detailed research studies, are rarely summarised, and the specific is used at the expense of the general. The reader may fairly be expected to draw his own conclusions from the wealth of well-illustrated factual material provided. J. B. L.

Mountains with a Difference. By GEOFFREY WINTHROP YOUNG. 8½×5½. Pp. ix+282. 14 illustrations. [The New Alpine Library.] Eyre and Spottiswoode Ltd, 1951. 18s.

Geoffrey Winthrop Young was one of the band of enthusiasts who did much to develop climbing in this country in the period before the first world war. He took part in the making of many new routes not only in this country but also in the Alps, and his travels extended even as far as Asia Minor. The author had a wide contact with the best known climbers of the day, which adds interest to the book—written in Young's known high literary style. A. H.

ATLASES

Weltatlas: Die Staaten der Erde und ihre Wirtschaft. Edited by EDGAR LEHMANN. 9½×13. Pp. viii+97 (coloured maps)+63 (gazetteer). Leipzig: VEB Bibliographisches Institut, 1952.

In this atlas, planned and edited by the Director of the Deutsches Institut für Länderkunde in Leipzig, the maps are conveniently arranged so that each political map faces a corresponding economic map. More than half the number of maps is devoted to European countries. Owing to hachures and a plethora of names, the topographical-political maps are not attractive. In the 1:4,500,000 map of the British Isles, the way, Lochgilphead and Balmoral are shown, but not Hawick and St Andrews. The insipid economic maps, however, invite study: land use, predominating crops and livestock, mineral resources, and industries are clearly shown by colour and other symbols, which are explained in a handy loose-leaf copy of the key bound at the beginning of the atlas. Additional symbols for highly specialised industries are explained in the relevant maps.

Here and there, Professor Lehmann admits, recent information was not accessible. Nevertheless, the atlas is useful and of considerable interest. J. H. K.

Atlas of the World's Resources. [UNIVERSITY OF MARYLAND.] $12\frac{1}{2} \times 15\frac{1}{2}$. Vol. II. *The Mineral Resources of the World.* By WILLIAM VAN ROYEN, OLIVER BOWLES, and ELMER W. PEHRSON. Pp. ix+181. 186 figs. New York: Prentice-Hall Inc., 1952. London: Constable and Co. Ltd, 1953. 70s.

This useful *Atlas* contains seventy maps of world production and distribution of mineral commodities and electric power. There is also a description of the provenance of each mineral, an account of the methods used in its exploitation, and a discussion of its economic importance in production and trade. The more important minerals, such as coal and oil, are treated in some detail; numerous larger scale maps and statistical tables show the production and reserves of their major fields of occurrence. B. F.

PUBLICATIONS RECEIVED

EUROPE

Europa Touring: Motoring Guide of Europe. 10×6 . Pp. 628. Maps, plans, illustrations, tables. Bern: Halweg AG, 1954. 30s.

The British Isles: A Geographic and Economic Survey. By L. DUDLEY STAMP and S. H. BEAVER, with a contribution by H. S. BOOKER. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. xii+780. 331 figs. London: Longmans, Green and Co. Ltd. Fourth edition, 1954. 42s.

Summary of Progress of the Geological Survey of Great Britain and the Museum of Practical Geology for the Year 1953. $9\frac{1}{2} \times 6$. Pp. iv+89. London: H.M. Stationery Office, 1954. 3s.

Index of Agricultural Research in Progress during 1953-54. $9\frac{1}{2} \times 6\frac{1}{2}$. Pp. 118. [Agricultural Research Council.] London: H.M. Stationery Office, 1954. 5s.

The Bridges of Britain. By ERIC DE MARE. $10 \times 7\frac{1}{2}$. Pp. 226. 156 illustrations. London: B. T. Batsford Ltd, 1954. 42s.

It's an Old Scottish Custom. By NEIL MCCALLUM. 8×5 . Pp. 192. London: Dennis Dobson Ltd, 1951. 10s 6d.

Modern Scotland: A Short History from 1707 to the Present Day. By JAMES SCOTLAND. $7\frac{1}{2} \times 5$. Pp. xii+260. 39 illustrations. London: G. Bell and Sons Ltd, 1953. 10s 6d.

Charters and other Records of the City and Royal Burgh of Kirkwall, with the Treaty of 1468 between Denmark and Scotland. Edited by JOHN MOONEY, F.S.A. SCOT. $9\frac{1}{2} \times 7\frac{1}{2}$. Pp. xxiii+1-128. 12 illustrations. Map. *Noltland Castle.* By W. DOUGLAS SIMPSON, M.A., D.LITT. Pp. 129-164. 25 figs. Aberdeen: Printed for the Third Spalding Club, 1952.

The Highlands of Scotland in Pictures. By ALASDAIR ALPIN MACGREGOR. Foreword by The Rt. Hon. Thomas Johnston, LL.D., F.R.S. $9\frac{1}{2} \times 7$. Pp. 128. Illustrated. London: Odhams Press Ltd, N.D. 12s 6d.

The Highland Jaunt: A Study of James Boswell and Samuel Johnson upon their Highland and Hebridean Tour of 1773. By MORAY McLAREN. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 272. 15 illustrations. London: Jarrolds Publishers Ltd, 1954. 16s.

Highland and Traditional Scottish Dances. By D. G. MACLENNAN. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 96. Illustrated. Edinburgh: D. G. MacLennan, 1950. 15s.

The Islands of Scotland (excluding Skye). Edited by W. W. NAISMITH and E. W. HODGE. Foreword by R. M. Gall Inglis. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. viii+203. 11 figs. 44 photographs. [The Scottish Mountaineering Club Guide.] Edinburgh: The Scottish Mountaineering Club. Second edition, 1952. 15s.

Climber's Guide to Ben Nevis. By G. GRAHAM MACPHEE. $6\frac{1}{2} \times 4\frac{1}{2}$. Pp. xii+156. 14 figs. Edinburgh: The Scottish Mountaineering Club, 1954.

Oban and District. By G. DOUGLAS BOLTON. $8\frac{1}{2} \times 6\frac{1}{2}$. Pp. 55. 38 photographs. Sketch map. Edinburgh and London: Oliver and Boyd Ltd, N.D. 5s.

Fifty Week-end Walks round Glasgow. By JAMES N. LEDINGHAM, M.A., LL.B. $7\frac{1}{2} \times 4\frac{1}{2}$. Pp. viii+120. 50 sketch maps. London: Hodder and Stoughton Ltd, 1952. 3s 6d.

Byways in Lakeland. By WILLIAM T. PALMER. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 256. 33 photographs. London: Robert Hale Ltd, 1952. 18s.

ASIA

Relação da Primeira Viagem do Ministro do Ultramar às Províncias do Oriente no Ano de 1952. 9½×6½. Vol. I. Pp. 478. 74 illustrations. Map. Lisboa: Agência Geral do Ultramar, 1953.

The Course of the Bhagirathi Ganga in the Himalayas. By H. L. CHHIBBER. Reprint: The Himalaya, 1952, 1 (2): 29-35.

The River Terraces of the Bhagirathi between Gangotri and Tehri, Tehri Garhwal Himalaya, their Age and the Age of the Bhagirathi and other similar Himalayan Rivers. By H. L. CHHIBBER. Reprint: The Journal of Scientific Research, Banaras Hindu University, 1952-53, 3: 62-75. 4 figs.

Tibetan Journey. By GEORGE N. PATTERSON. 8½×5½. Pp. 232. 16 illustrations. 2 maps. London: Faber and Faber Ltd. Third impression, 1954. 15s.

Bandoola. By J. H. WILLIAMS. 8½×5½. Pp. 251. Illustrated by H. C. Pitz. London: Rupert Hart-Davis Ltd, 1953. 15s.

Hong Kong. By HAROLD INGRAMS. Foreword by The Rt. Hon. Oliver Lyttelton, M.P. 8½×5½. Pp. xii+307. 5 drawings. 40 plates. 7 sketch maps. 2 street plans. Folding map. [The Corona Library.] London: H.M. Stationery Office, 1952. 27s 6d.

Wall of Spears: The Gobi Desert. By MILDRED CABLE and FRANCESCA FRENCH. 7½×5½. Pp. 178. Illustrated by Joan Kiddell-Monroe. End-paper sketch map. London: Lutterworth Press, 1951. 8s 6d.

AFRICA

Sierra Leone: A Modern Portrait. By ROY LEWIS. 8½×5½. Pp. ix+263. 10 drawings. 31 plates. 5 sketch maps. Folding map. [The Corona Library.] London: H.M. Stationery Office, 1954. 25s.

Apes and Ivory. By JOY PACKER. 8½×5½. Pp. xii+400. 3 illustrations. End-paper map. London: Eyre and Spottiswoode Ltd. Fourth impression, 1954. 25s.

The Year Book and Guide to Southern Africa. Edited by A. GORDON-BROWN, F.R.G.S. 7½×4½. Pp. liv+860+48 (atlas)+127 (advertisements). London: Union-Castle Mail Steamship Co. Ltd, 1954. Robert Hale Ltd. 9s 6d.

ATLANTIC OCEAN

The Bombard Story. By ALAIN BOMBARD. Translated by Brian Connell. 8½×5½. Pp. 214. 5 figs. 10 illustrations. London: André Deutsch Ltd, 1953. 12s 6d.

AMERICA

The University of Chicago Department of Geography Research Papers. 9×6. (Litho-printed.) No. 13 [1950]; No. 22 [1951]; Nos. 23-27 [1952]; Nos. 28-30 [1953]. Chicago, Ill.: Department of Geography, University of Chicago.

México en Cifras, 1952. 9×12½. Pp. 96. Statistical diagrams in colour. Mexico, D.F.: Secretaría de Economía, Dirección General de Estadística, 1953.

Septimo Censo General de Población, 6 de Junio de 1950. 10½×8½. 16 parts. Mexico, D.F.: Secretaría de Economía, Dirección General de Estadística, 1952.

The Sunlit Caribbean. By ALIC WAUGH. 8½×5½. Pp. 160. 17 illustrations. End-paper sketch map. [Windows on the World.] London: Evans Brothers Ltd. Revised edition, 1953. [Cf. S.G.M., 65 (2): 105.]

The Impossible Adventure: Journey to the Far Amazon. By ALAIN GHEERBRANT. Translated by Edward Fitzgerald. 8×5. Pp. 390. 32 illustrations. 3 sketch maps. London: Victor Gollancz Ltd, 1953. 16s.

Exploration Fawcett. By Lt-Col. P. H. FAWCETT, D.S.O., F.R.G.S. Arranged from his manuscripts, letters, log-books and records by Brian Fawcett. 9×6. Pp. xvi+312. 49 illustrations. End-paper maps. London: Hutchinson and Co. Ltd, 1953. 15s.

Race and Class in Rural Brazil. Edited by CHARLES WAGLEY. 8½×5½. Pp. 160. 2 figs. 8 plates. [The Race Question in Modern Science.] Paris: Unesco, 1952. \$1.25, or 7s 6d.

Prehistoric Settlement Patterns in the Virú Valley, Perú. By GORDON R. WILEY. 9×6. Pp. xxii+453. 88 figs. 60 illustrations. [Smithsonian Institution, Bureau of American Ethnology, Bulletin 155.] Washington, D.C.: U.S. Government Printing Office, 1953. \$4.00.

AUSTRALASIA

Venturing to Australia. By RAY DORIEN. $7\frac{1}{2} \times 5$. Pp. 246. Sketch map. London: Christopher Johnson Ltd, 1951. 10s 6d.

Statistical Register of Western Australia for 1950-51. Compiled from Official Records by R. J. LITTLE, Government Statistician. $9\frac{1}{2} \times 6$. Parts paged separately. Folding Map. Perth, W.A.: William H. Wyatt, Government Printer, 1953.

POLAR REGIONS

Det nye Grenland og Kongeparrets Rejse. Edited by KJELD RASK THIERKILSEN. Introduction by Ebbe Munck. Translation by Eigil Andersen. $13 \times 10\frac{1}{2}$. Pp. 64. Illustrated. København: Berlingske Forlag, 1952.

The White Desert: The Official Account of the Norwegian-British-Swedish Antarctic Expedition. By JOHN GIAEVER. Contributions by G. de Q. Robin, E. F. Roots, V. Schytt, and B. Walford. Translated from the Norwegian by E. M. Huggard. Foreword by J. M. Wordie. $9\frac{1}{2} \times 6$. Pp. 304. 31 plates. 10 figs. London: Chatto and Windus Ltd, 1954. 25s.

CARTOGRAPHY

The Story of Maps. By LLOYD A. BROWN. $10 \times 7\frac{1}{2}$. Pp. xix+397. Bibliography. 82 illustrations. End-paper maps. London: The Cresset Press Ltd, 1951. 50s.

Die Geschichte der Kartographie. By LEO BAGROW. $9\frac{1}{2} \times 8\frac{1}{2}$. Pp. 383. Particulars of 1435 cartographers. 97 figs. 112 plates. 8 coloured plates. Berlin: Safari-Verlag, 1951. 70s.

Modern Cartography: Base Maps for World Needs. 9×6 . Pp. 95. [U.N. Publications, Sales No. 1949. I. 19.] Lake Success, N.Y.: United Nations Department of Social Affairs, 1953. London: H.M. Stationery Office, 1950. 7s 6d.

Norge i Kart gjennom 400 Ar. Med Opplysninger om dem som utformet Kartbildet. By SIGURD ENGELSTAD. English Foreword. Introduction by Kristian Nissen. 9×6 . Pp. 112. 10 plates. Annotated list of 471 maps and charts of Norway. Oslo: J. W. Cappelen's Antikvariat, 1952.

EDUCATIONAL

Matematisk Geografi. By AGVALD GJELSVIK. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 128. 115 figs. 4 maps. Oslo: N. W. Damm og Son, 1954.

The Teaching of Geography in Secondary Schools. Issued by the INCORPORATED ASSOCIATION OF ASSISTANT MASTERS IN SECONDARY SCHOOLS. Foreword by A. W. S. Hutchings. $7\frac{1}{2} \times 4\frac{1}{2}$. Pp. xxiv+512. London: George Philip and Son Ltd. Third edition, 1952. 17s 6d.

The Geographical Interpretation of Topographical Maps. By ALICE GARNETT, B.A., PH.D. $7\frac{1}{2} \times 5$. Pp. 310. Frontispiece. 34 figs. 25 map sheets in separate cover. [Harrap's New Geographical Series.] London: George G. Harrap and Co. Ltd. Third edition, revised, 1953. 10s 6d.

Globe and Map. By OLIVE GARNETT. 8×6 . Pp. viii+55. Photographs and diagrams. [The Discovery Books, 3, Part 2.] Oxford: Basil Blackwell, 1953. 3s.

Adventure of the World. By JAMES FISHER. Art Editor: F. H. K. Henrion. $13 \times 9\frac{1}{2}$. Pp. 68. Shadow relief maps, isotypes, and paintings. London: Rathbone Books, 1954. 10s 6d.

Icebergs and Jungles. By SHIRLEY CARPENTER and MARIE NEURATH. $10\frac{1}{2} \times 8$. Pp. 30. Illustrated. [The World in Pictures.] London: Rathbone Books, 1954. 4s 6d.

Mountains and Valleys. By SHIRLEY CARPENTER, MARIE NEURATH, and STEWART IRWIN. $10\frac{1}{2} \times 8$. Pp. 30. Illustrated. [The World in Pictures.] London: Rathbone Books, 1954. 4s 6d.

The Earth—Man's Heritage. By W. F. MORRIS, B.A., F.R.G.S., and R. W. BROOKER, M.A. $8 \times 5\frac{1}{2}$. Pp. 240. 73 figs. [The Charter Geographies.] London: George G. Harrap and Co. Ltd, 1953. 8s 6d.

Man and his World: A Course in History and Geography. By JAMES MAINWARING, M.A., D.LITT., F.R.HIST.S. Book III. The World's Wealth and its Problems. $7\frac{1}{2} \times 5\frac{1}{2}$. Pp. xii+346+vi. 180 figs. London: George Philip and Son Ltd, 1949. 7s 6d.

EIGHTEENTH INTERNATIONAL GEOGRAPHICAL CONGRESS

The Eighteenth International Congress is to be held in Rio de Janeiro, and has been tentatively scheduled for August 9-18, 1956. So that the Preliminary Circular may reach the greatest possible number of geographers, the Organising Committee requests that all geographers not included in the World Directory of Geographers published in 1952 by the International Geographical Union please send their names and addresses to Professor Hilgard O'Reilly Sternberg, Secretário Executivo, XVIII Congresso Internacional de Geografia, Avenida Presidente Antonio Carlos 40, 9º andar, Rio de Janeiro, Brazil. Professor Sternberg should also be notified of any changes of address from that given in the Directory.

SABENA INTERNATIONAL PRIZE

The Sabena International Prize of 75,000 Belgian Francs will be awarded to the winner of an International Geography Competition, which is open to competitors of any nationality who reside in one of the 32 countries reached by the Belgian Airlines, and who are not over 30 years of age on May 23rd, 1955, the anniversary of the establishment of Sabena. Entries will be accepted up to midnight on April 30th, 1955.

The subject of the study to be submitted for the competition is "Aviation and Social Geography", with reference to the influence of air transport on the human factors of the countryside. Not more than 200 double-spaced typewritten, quarto sheets should be used for writing the study, including the bibliography, but not including space taken up by illustrations. All entries must be original and unpublished work, and must not have been entered for any other competition or examination.

The adjudicators, of whom the Chairman is Professor Pierre Gourou, are H. Boesch (Zürich), R. J. Harrison Church (London), M. E. Dumont (Ghent), F. Milone (Rome), and G. Perier (Président du Conseil d'Administration de la Sabena).

The prize will be awarded by July 15th, 1955, and the prize money will be paid in cash in Brussels or at the point used by Sabena nearest to the winner's address, in local currency.

All correspondence concerning participation in the Sabena International Prize as well as requests for further details should be addressed to: Sabena International Prize, Air Terminus, Brussels, Belgium.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

PROCEEDINGS

A MEETING OF COUNCIL was held on 26th October 1954.

AWARDS: *The Scottish Geographical Medal* (formerly The Society's Gold Medal) was awarded to John Bartholomew, M.C., in recognition of outstanding work in Cartography.

The Research Medal was awarded to the Rev. James I. Macnair, D.D., Founder and Chairman of the Scottish National Memorial to David Livingstone Trust, for research into the work and life of David Livingstone.

The Diploma of Fellowship was awarded to George N. Patterson in recognition of explorations in Tibet; John Bartholomew, M.C., for outstanding service to the Society over a period of thirty-five years, first as Hon. Secretary and later as President; John A. Ferguson, M.A., B.A., for distinction in geographical work as a teacher of geography and for services to the Society as Chairman of the Glasgow Centre; Edward Wyllie Fenton, M.A., D.Sc., for his work and publications on human geography and plant geography.

THE SOCIETY'S REPRESENTATIVES: The following Members of Council have been appointed to fill vacancies in the representation of the Society on the *National Committee for Geography*, Professor A. C. O'Dell; *National Trust for Scotland*, John Bartholomew; *National Institute of Oceanography*, Professor Ronald Miller.

PRESENTATION: The Council expressed its thanks to Mr J. M. H. Wright, of Greengarth, West Linton, for his magnificent gift of a 1:60 scale model of Captain James Cook's Bark *Endeavour*, and which he repaired after an accident in the Society's Rooms, and returned in a glass case, at his own expense.

ANNUAL GENERAL MEETING

The Annual General Meeting was held in the Society's Rooms in Edinburgh, 5th October 1954, the President in the Chair.

The Annual Report of the Council and the Financial Statement were unanimously adopted.

The following Members of the Society were unanimously elected to be :

President : Douglas A. Allan.

Vice-Presidents serving on Council : Sir Hugh McPherson ; J. Cameron Smail ; Douglas Guthrie ; Arthur W. Russell ; Alexander Harrison ; Archibald E. Robertson ; John Johnston ; John Bartholomew.

Members of Council : William Burns ; Lady A. M. Clow ; G. C. Dewar ; George Dott ; Arthur Geddes ; A. B. Hyslop ; J. B. Hamilton ; William Latimer ; Miss B. P. MacFarlane ; H. A. Moisley ; Henry M. Paton ; J. E. Richey ; F. D. N. Spaven ; Betty M. Third ; William Watt.

Chairmen of Centres : *Glasgow* : Ronald Miller ; *Dundee* : John Watson ; *Aberdeen* : Andrew C. O'Dell.

The other Office-Bearers were re-appointed.

LECTURE SESSION 1954-1955

The following lectures were delivered :

EDINBURGH. *Usher Hall*.—MALCOLM MILLER, on "High Adventure : Patagonia and Alaska", October 14th. WALTER F. STARKIE, C.M.G., C.B.E., LITT.D., on "Andalusian Journey", November 11th. *Central Hall*.—Miss KATHERINE TOUSEY, on "Audubon's America", October 20th. JOHN HEAP and D. M. STEVEN, M.A., D.PHIL., on "The Edinburgh University Expedition to Arctic Norway, 1953", November 3rd. IAN CHARLSON, on "Climbing in the Alps", November 11th. *The Society's Rooms*.—[New Developments in Geography.] H. A. SHEWAN, Q.C., on "Crofting in Scotland", October 21st. E. A. HOGAN, C.B.E., H.M. Registrar for Scotland, on "The Census in Scotland Analysed", November 25th.

GLASGOW. *Grand (St Andrew's) Hall*.—MALCOLM MILLER, on "High Adventure : Patagonia and Alaska", October 13th. WALTER F. STARKIE, C.M.G., C.B.E., LITT.D., on "Andalusian Journey", November 10th.

DUNDEE. *Training College*.—JOHN HEAP and D. M. STEVEN, M.A., D.PHIL., on "The Edinburgh University Expedition to Arctic Norway, 1953", October 11th. WALTER F. STARKIE, C.M.G., C.B.E., LITT.D., on "Andalusian Journey", November 8th.

ABERDEEN. *T.M.C.A. Hall*.—LORD TWEEDSMUIR OF ELSFIELD, O.B.E., LL.D., F.R.G.S., F.R.S.A., on "The Klondyke Gold Rush of '98", October 15th. WALTER F. STARKIE, C.M.G., C.B.E., LITT.D., on "Andalusian Journey", November 9th.

BRUCE MEMORIAL PRIZE : 1954 AWARD

The Dr. W. S. Bruce Memorial Prize for 1954 has been awarded to RICHARD MAITLAND LAWS, M.A., PH.D.(CANTAB.), National Institute of Oceanography, for his investigations in the South Orkney Islands and South Georgia, particularly on the biology and life history of elephant seals.

NEWBIGIN PRIZE

A Bronze Medal and Money Prize will be awarded for the best Essay, suitable for publication in *The Scottish Geographical Magazine* and not exceeding 7000 words in length, on any subject relating to the geography of Scotland.

Essays, typed and with any illustrations prepared for reproduction, in envelopes marked "Newbiggin Prize", should be lodged with the Secretary, Royal Scottish Geographical Society, Synod Hall, Edinburgh 1, on or before 31st October 1955.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

REPORT OF COUNCIL

SEVENTIETH SESSION, 1953-1954

(For the year 1st May 1953 to 30th April 1954)

The Council have the honour to submit the following Report :—

MEMBERSHIP

The changes during the Session are as follows :—

On the Roll at 1st May 1953	.	.	.	.	.	.	.	2237
New Members	.	.	.	.	.	.	.	1056
								3293
Deduct by Death	.	.	.	.	.	.	.	26
„ Resignation	.	.	.	.	.	.	.	258
								<u>284</u>
On the Roll at 30th April 1954	.	.	.	.	.	.	.	<u>3009</u>

The fluctuation in the different categories of Membership at the four centres of the Society is analysed thus :—

	April 1953	April 1954		April 1953	April 1954
<i>Edinburgh.</i>			<i>Glasgow.</i>		
Life . . .	278	270	Life . . .	27	28
Ordinary . .	942	1269	Ordinary . .	376	684
Associate . .	48	54	Associate . .	10	8
Junior . . .	119	145			
Corporate			Corporate		
(Schools) . .	13	15	(Schools) . .	26	29
<i>Aberdeen.</i>			<i>Dundee.</i>		
Life . . .	7	7	Life . . .	6	6
Ordinary . .	186	282	Ordinary . .	60	79
Associate . .	2	2	Associate . .	—	2
<i>Outside Area</i>			<i>Honorary</i>		
<i>Members</i> . .	112	113	<i>Members</i> . .	25	16

MEDAL AWARDS

The Livingstone Gold Medal was awarded to Colonel Sir John Hunt, K.B.E., D.S.O., for leadership of the team which conquered Everest, 1953, and to Sir Edmund Hillary, K.B.E., for perseverance and will-power in reaching the summit of Everest, 1953.

The Mungo Park Medal was awarded to Alain Bombard, M.D., for courage and perseverance in crossing the Atlantic alone, in the cause of science.

The Scottish Universities' Medals were awarded to :—James K. Lindsay, St. Andrews University ; Archibald S. Brown, Glasgow University ; Philip Theodore Wheeler, Aberdeen University ; T. H. Masterton, Edinburgh University.

FELLOWSHIP OF THE SOCIETY

The Diploma of Fellowship and Honorary Life Membership were conferred upon :—Mr. D. Alan Stevenson and Mr. Donald G. Moir, for eminent services rendered to the Society over the past years.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY ORDINARY REVENUE AND EXPENDITURE ACCOUNT

Year to 30th April 1954

REVENUE		EXPENDITURE	
Year to 30th April 1954	Year to 30th April 1953	Year to 30th April 1954	Year to 30th April 1953
Subscriptions :-		Magazines—Expenses of Publications :-	
£1,207 Ordinary	£3,147 10 6	£227 Printing	£598 12 11
177 Schools Corporate	248 19 0	120 Editing	180 0 0
60 Junior Members	72 0 0	131 Illustrations	310 4 5
		143 Wrappers, Index and Miscellaneous	37 4 1
		60 Postages	64 4 6
£3,444	£3,468 9 6		£1,059 5 11
LIFE MEMBERSHIP FEES :-		Less : Current Magazines sold	
119 Portion applicable to Revenue	116 8 6		£245 12 2
275 GOVERNMENT GRANT	275 0 0	Advertisements	
2 GENERAL DONATIONS	2 0 0	Grant from Carnegie Trust towards expenses of publishing Magazine for 1953-54	
1,189 DIVIDENDS AND INTEREST	£1,235 13 11		100 0 0
	100 0 0		436 28 8
Less—Provision for Amortisation			£622 13 9
	1,125 13 11		
		Rooms—Upkeep of :-	
		Rent, Rates and Insurance	
		Cleaning and Repairs	
		Heating and Lighting	
		Equipment and Furnishings	
		Less—Donations	
			£597 4 9
			112 10 0
			394 8 9
		LECTURES	
		Less—Received for Tickets sold	
			£448 16 7
			1,376 3 9
		SALARIES	
		AUDITOR'S FEE	
		LIBRARY—Books, Maps and Furnishings	
		GENERAL PRINTING	
		STATIONERY	
		TELEPHONE AND TELEGRAPHIC ADDRESSES	
		ADDRESSOGRAPH	
		MEDALS	
		POSTAGES	
		MISCELLANEOUS	
		LOSS ON REALISATION OF INVESTMENTS	
		Less—Applied from Provision for Amortisation	
		PROVISION FOR CURRENT AND DEFERRED EXPENDITURE	
		SURPLUS FOR YEAR	
		(Deficit)	
			£4,987 11 11
			£4,987 11 11

BALANCE SHEET as at 30th April 1954

ASSETS

LIABILITIES

As at 30th April 1954

As at 30th April 1953

As at 30th April 1953.

ASSETS

LIABILITIES

As at 30th April 1953.

As at 30th April 1953.

I. INVESTMENTS :-		II. RESERVES, etc. :-		III. FUNDS OF THE SOCIETY :-	
£7,744. 9s. 4d. 4% Consolidated Loan (1937 or after)	£7,707 14 5	Glasgow Equipment Fund Balance at 30/4/53	£60 4 0	(a) LIFE MEMBERSHIP FUND :-	
£5,500 3 1/2% Conversion Loan (1951 or after)	5,772 13 6	Provision for Current and Deferred Expenditure for Books, Maps, etc., as at 30/4/53	2,227 15 0	Balance at 30th April 1953	£2,261 14 3
£390 4 1/2% Guaranteed Land Stock	500 13 6			Sums received during year to 30th April 1954	66 15 0
£5,693. 10s. 11d. 3 1/2% Savings Bonds 1960-70	5,522 13 6			Less—Sum transferred to Revenue Account	£4,328 9 3
£4,105. 3s. 3d. 3% Savings Bonds 1965-75	4,773 17 4				116 8 6
£3,000 British Electricity 3% Guaranteed Stock 1968-73	2,944 7 0			(b) DR. J. G. BARTHOLOMEW FUND.	£2,212 0 9
£4,000 British Transport 3% Guaranteed Stock 1978-88	3,793 2 0			(c) J. E. TOUCHER BEQUEST	1,000 13 6
£4,113. 18s. 8d. British Gas 3% Guaranteed Stock 1990-93	4,119 12 4			(d) RAIPER RICHARDSON BEQUEST	668 1 4
£50 Commercial Union Assurance Co. Ltd. Ordinary Stock	513 7 0			(e) GENERAL FUND :-	47,738 11 7
£70 Royal Insurance Co. Ltd.	796 10 2			Balance at 30th April 1953	£1,531 14 2
£700 Second Scottish Eastern Investment Trust Ltd. 5% Cum. Pref. Stock	693 11 4			Add—Legacy from R. J. DUNCAN	250 0 0
£1,000 Third Scottish National Trust Co. Ltd. 5% Cum. Pref. Stock	981 4 8			Surplus for year	104 1 6
Less—Provision for Amortisation to date	£35,000 6 0				
(Market Value as at 30th April 1954, £35,374) (1953, £31,586)	334 7 4				
II. Sundry Debts :-	£34,664 19 5				
On Deposit Receipt	5 0 0				
On Current Account	549 14 0				
On Petty Cash	80 0 0				
	1,519 14 0				
III. Cash in Bank and on Hand :-	£36,599 13 5				
IV. Income Received—Interest on Stocks	£1,516 7 5				
	25 0 2				
	£1,511 7 7				
DR. M. L. NEWBIGIN MEMORIAL					
FUND AS AT 30th April 1953					
Income Received—Interest on Stocks	£604 9 7				
	14 11 7				
	£619 0 8				
FUND AS AT 30th April 1954 :-					
£313. 18s. 6d. 3% Savings Bonds 1960-75	£189 6 6				
£75 4 1/2% Defence Bonds	75 0 0				
£50 3 1/2% Do.	50 0 0				
Cash in Bank	£644 6 6				
	54 14 2				
	£699 0 8				

Edinburgh, 2. 1. 54 / July 1954.—I have examined the Accounts of the Royal Scottish Geographical Society for the year to 30th April 1954, of which the above is an Abstract, and compared them with the Vouchers and Instructions thereof, and I find the whole to be correctly stated and sufficiently vouched and instructed.

GORDON G. RUFFLE, C.A., Auditor.

MEETINGS OF THE SOCIETY

The Society held fifty Meetings during the Session. In Edinburgh: nine Lectures in the Usher Hall; ten Afternoon Lectures in the Central Hall, Tollcross; five Geographical Papers in the Society's Rooms, and one Film Show for Young People in the Synod Hall.

In Glasgow there were eight Evening Lectures, one Lecture Lunch and a Children's Hogmanay Film Show. In Aberdeen there were eight Evening Lectures, and in Dundee seven. Lectures are currently listed in *The Scottish Geographical Magazine*.

THE SCOTTISH GEOGRAPHICAL MAGAZINE

Owing to cost of production, the number of pages of the text in Volume 69 could not be increased beyond 144, to which it had been reduced in Volume 68.

The Council gratefully acknowledge a grant towards cost of production received from the Carnegie Trust, and record their thanks to the contributors of original papers and of reviews of books. The receipt of current publications from authors and publishers is likewise much appreciated.

SCOTTISH PLACE NAMES COMMITTEE

The work of advising the Ordnance Survey on the spelling of place names has been continued. In the Lowlands, Peeblesshire, most of Lanarkshire and Ayrshire, and a portion of Stirlingshire have been dealt with, and in the "Gaelic" areas parts of Islay, Jura, and Kintyre. Over a limited field of spellings the "Gaelic" sub-committee has received 60 per cent. acceptances, but the percentage in the Lowlands has been much lower.

DONATIONS

During the year to 30th April 1954 donations to the funds of the Society amounting to £252 were received, these including a legacy of £250 bequeathed by the late R. J. Duncan.

LIBRARY AND MAP DEPARTMENT

Additions to Library:—189 books, of which 32 were purchased; 23 pamphlets; 5000 maps and charts. An important addition is a complete photostat set of Roy's MS. Map of Scotland.

During the Session 5163 books and 270 lantern slides were issued to Members.

The Council thank those who have supported the Society with the presentation of books, maps, charts, lantern slides and films.

OBITUARY

During the year the Society suffered the loss by death of Professor Alan Grant Ogilvie, for many years an Honorary Secretary, and latterly President of the Society, and the first holder of the Chair of Geography in Edinburgh University.

THE SOCIETY'S REPRESENTATIVES

The following Members were appointed to represent the Society on the bodies named:—

Bruce Memorial Prize Committee.—James M. Wordie; Prof. R. N. Rudmose Brown.

Joint Committee for Anthropological Research and Training.—Robert Kerr.

National Committee for Geography.—Vacant.

National Trust for Scotland.—John Bartholomew, M.C., M.A.

Permanent Committee on Geographical Names.—John C. Bartholomew.

Scottish National Memorial to David Livingstone.—Lt.-Col. John Johnston.

National Institute of Oceanography.—Professor Ronald Miller.

Announcing the 1955 Edition of the
HANDBOOK
FOR GEOGRAPHY TEACHERS

Editor: G. CONS, M.A.

*Senior Lecturer in Geography, Goldsmiths' College,
University of London*

A new edition of this indispensable work (first edited by Miss D. M. Forsaith), re-written, re-set and greatly enlarged, will be ready early in 1955, and may now be ordered. It has been undertaken by the **STANDING SUB-COMMITTEE IN GEOGRAPHY IN THE UNIVERSITY OF LONDON INSTITUTE OF EDUCATION**, and is the co-operative work of University Lecturers, Training College Lecturers and School Teachers. The classified and annotated book lists which have always been an outstanding feature have been compiled afresh by a team of geographers, and are as complete and up-to-date as they can be made.

About 448 pages

Crown 8vo

12s. 6d.

METHUEN & CO. LTD., 36 Essex St., London W.C.2

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY
PUBLICATIONS

THE EARLY MAPS OF SCOTLAND

With an account of the Ordnance Survey by a Committee of the Royal Scottish Geographical Society. Profusely illustrated with reproductions of old maps. Over 1400 maps and plans are described.

Second edition revised. Price 30s.

THE PLACE-NAMES OF BERWICKSHIRE

By **JAMES B. JOHNSTON, B.D., F.R.HIST.S.**

Place-names of Scotland Series, No. 1.

Paper covers. Price 2s. 6d.

EARLY SCOTTISH MAPS AND TRAVEL

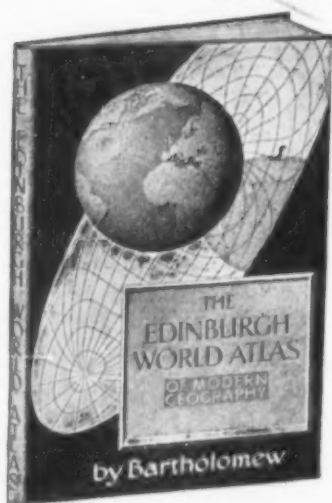
By **D. G. MOIR**

A short account, prepared on the occasion of the Society's Exhibition, August 1947, of surveys, maps, and travel, from the Roman invasion to the beginning of the nineteenth century. Price 6d.

THE SCOTTISH GEOGRAPHICAL MAGAZINE

Overseas subscription (at present) 15s. p.a., post free.

THE EDINBURGH WORLD ATLAS OF MODERN GEOGRAPHY



This work, originally issued in 1950 for academic purposes, has been described as the greatest cartographic advance of the half-century, on account of its new principles of projection and other original features. It is now offered, under this new title, to a larger field of the scientifically-minded public, in the form of a general reference atlas in an especially handsome binding.

Important distributions such as Vegetation and Density of Population are given special emphasis by continents together with maps of comparative Rainfall and Temperature. World Subjects include Climatology, Oceanography, Geology, Agriculture, Ethnology, etc.

Two interesting early maps of the world are reproduced inside the covers: Ruysch's Map of 1508 and Wright's Map of 1599.

160 pages. Size $14\frac{1}{2}$ in. \times 10 in. Prospectus available on request.

Just Published. 36/- net.

Our new complete catalogue will be sent free on request. New editions of the **Handy Reference Atlas of the World**, 25/-, and the **Road Atlas of Great Britain**, 12/6, have recently been published.

JOHN BARTHOLOMEW & SON LTD
The Geographical Institute, 12 Duncan Street, Edinburgh 9

Printed in Great Britain by
T. & A. CONSTABLE LTD., Edinburgh